

Subjects and Agents*

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0. Introduction.

In this paper a theory will be developed about the representation of purpose in deep structure. The theory is that a sentence expresses purpose if and only if its deep structure has a subject. Consider, for example, the following sentence:

John frightened the baby.

There are two interpretations of this. Either John may have frightened the baby on purpose, or it may have been something about John or something he did that frightened the baby. The ambiguity will be accounted for by assigning this sentence two deep structures. The deep structure corresponding to the purposive interpretation has the subject John. The non-purposive interpretation, on the other hand, corresponds to a subjectless deep structure.

The argument will proceed in three steps. In sections 1-4 we will narrow down the general problem of how purpose is represented in deep structures to a more tractable subproblem. The subproblem is to account for the identity between subjects of clauses introduced with by and subjects of the main sentences in which these by-clauses occur.

In sections 5-9 it will be shown that this identity must be accounted for in two different ways. The first solution presupposes the presence of a deep structure subject, while the second presupposes a subjectless deep structure. Certain verbs, in fact, take optional subjects. Next, in section 10, we show that sentences with these verbs have a purposive interpretation if and only if there is a deep structure subject.

1. Extra complements and purposiveness.

There are a number of instances where the presence of an optional noun phrase complement to a verb is connected with purposiveness. Such an instance is the pair of sentences,

John broke the window.

The window broke.

We note that the first sentence may express purpose while the second may not. Furthermore, all the elements of the second sentence (the window and broke) have corresponding elements in the first sentence. The reverse is not the case, of course, since there is no John in the second sentence. We may reasonably conclude that the appearance of the complement John has something to do with the purposive interpretation of the first sentence. A similar example is

John broke the window with the hammer.

The hammer broke the window.

The elements all match up except for John and with in the first sentence.

The appropriate place to compare the complement structures is at the level of deep structure rather than surface structure. Consider

Harry broke John's leg with the tractor's right
front wheel.

versus

The tractor broke John's leg with its right front wheel.

On the surface, break has the same number of complements in each sentence, while the first sentence has a purposive interpretation and the second does not. In the second sentence, however, the tractor does not represent a deep structure complement. Note that its is a pronominalization of the tractor's, and cannot be construed in any other way. The subject the tractor thus does not contribute to the meaning of the sentence, since we have the paraphrase

The tractor's right front wheel broke John's leg.
That we must look at deep structures to find the extra complement is of course not surprising, since purpose is an aspect of the meaning of the sentence. By hypothesis, deep structures reflect the meaning of sentences more closely than surface structures.

We will follow Fillmore¹ in terming these extra complements

¹C. J. Fillmore, "The Case for Case" in Universals in Linguistic Theory, eds. E. Bach and R. Harms, Holt, Rinehart and Winston; 1968, pp. 1-88. Fillmore gives an extensive account of examples like those I have cited. I have just paraphrased some of what he says.

that have something to do with purpose 'agents'. About agents the following can be said. 1) They always refer to things or beings that can have purposes; hence, things that can at least move about on their own and, most often, thinking beings. 2) The sentences in which they occur express purpose, and the agent tells whose purpose. 3) If an agent is present, it becomes the surface subject unless the subject is deleted or the sentence is passivized. This last fact provides some justification for identifying agent with deep structure subject, at least in one direction. That is, if we say that an agent is always a deep structure subject, then (if nothing happens on the way to the surface) the agent will automatically become the surface subject.

Aside from break, two other verbs that take optional agents are begin and have. David Perlmutter has shown this to be the case with begin, in his dissertation, Deep and Surface Constraints in Syntax (M.I.T., unpublished, 1968). Begin takes one noun phrase complement in the deep structure of

The water began to freeze.

In the deep structure of

John began to freeze the water.

there is an extra complement, the agent John.

The situation with have is illustrated by

John has a shade on the lamp.

The lamp has a shade on it.

In the first sentence John is the agent, one of three complements. The deep structure of the second sentence has only two complements, a shade and on the lamp. The superficial subject

the lamp is secondary. (See my earlier paper "The English Preposition With" in Working Papers in Linguistics No. 1, 1967.)

In these examples the surface structure difference between the purposive and non-purposive sentences is not just the presence or absence of an agent. There are concomitant differences either in order, or in the appearance of a secondary noun phrase as subject of the non-purposive sentence. It is these other differences that cause trouble for any theory which seeks to localize the purposive element in the agent, since the other differences must be explained as automatic. That is, one must motivate transformations which introduce these differences. Justifying such transformations is not an easy task. There are cases, however, where the absence of an agent does not entail such differences. Notice that a genitive preceding and modifying the noun reason must be the genitive of an agent. Compare:

John's reason for falling down

the reason for John's falling down

The "reason" in the first phrase is a motive, and has to do with purpose. In the second phrase, besides being interpretable as a motive, the "reason" can be merely a cause. Unlike the first phrase, the second phrase need not express purpose. Knowing as little as I do about the syntax of reason, however, I acknowledge that this may be a rather superficial example.

Something similar is going on with the noun way. Compare:

What is John's way of doing that?

What is the way in which John does that?

"Way" in the first sentence is method, in the second sentence "way" is not necessarily method. The syntax of way is intimately involved with the behavior of manner adverbs, which will be discussed in the next section.

2. Agents and manner adverbs.

The principal concern of this paper will be the relationship

of agents to a peculiar type of manner adverbs, i.e. by-clauses. This section will examine, in a cursory fashion, the relationship of agents to manner adverbs in general.

A first question to ask about manner adverbs is: Where do they occur? We will discuss the matter from the standpoint of George Lakoff's paper "Stative Adjectives and Verbs in English" (in NSF-17, Harvard Computation Laboratory; 1966). In Lakoff's paper we find two statements about the provenience of manner adverbs:

"Manner adverbials that are subcategorized with respect to subjects can occur only with NON-STATIVE verbs. STATIVE verbs may not take such adverbials."
(p. I-10)

"Since stative verbs cannot take manner adverbials, they do not co-occur with the manner noun "way"."
(footnote, p. I-10)

"Manner adverbials that are subcategorized with respect to subjects" refers to adverbs that only occur with animate main sentence subjects. Lakoff's examples are enthusiastically, carefully, reluctantly, masterfully.

Notice that the two claims about manner adverbs, if taken quite literally, are distinct. In the first place, it is claimed that manner adverbs like enthusiastically only occur with non-stative verbs. In the second place the claim is extended to all manner adverbs. We will try to find out in what sense the broader generalization about manner adverbs holds.

Let us look first at the non-stative/stative distinction. It is a classification of verbs according to whether they can appear in a certain set of contexts. There are a number of environments, e.g. the command imperative, in which only non-stative verbs may occur. The point I wish to make here is that the tests should be divided into two groups. Some tests test

for something that is quite different from what the others test for. There are two grounds for the division I propose--distributional and semantic.

The first group of tests--let us call them 'A-tests'--is whether or not verbs can occur:

- 1) in the command imperative (Slice the salami.)
- 2) in the infinitival complements of persuade, remind (I persuaded John to slice the salami.)
- 3) with manner adverbs that require animate subjects (John sliced the salami enthusiastically.)

Other verbs that satisfy these tests are, e.g., kill, cause, annoy, assassinate. Thus these verbs are non-stative. Verbs that do not pass these tests and are therefore stative are, e.g., know, entail, love.

The second group of tests we will call 'P-tests.' For the moment we mention only one; another will be added later. The P-test is whether or not a verb can occur in the progressive. The non-stative verbs above, which pass the A-tests, may all occur in the progressive, while none of the stative verbs may. The remaining tests Lakoff gives I will not discuss.

The first thing to note is that there are verbs which pass the P-test, but fail the A-tests. Such verbs are rain, snow, happen, occur. So far as I know, however, there are no verbs which pass the A-tests but fail the P-test. We are led therefore to suspect that two different properties of verbs are involved--A and P. Semantically these two properties appear to be the following: verbs which pass the A-tests are verbs which can appear as main verbs in sentences which express purpose. Indeed, the contexts which provide the A-tests are contexts which require a purposive interpretation. The progressive, on the other hand, expresses a process (with exceptions as noted by Lakoff--sit, keep, etc.). It follows that

only verbs which can express processes pass the P-test.

The stative verbs, which fail all the tests, do so for two different reasons. Know, for example, fails the A-tests because "knowing" cannot be purposeful. It fails the P-test because "knowing" is not a process.

Thus the verbs which pass the P-tests, but fail the A-tests are verbs which express processes which cannot be purposeful. I have no explanation for the fact, if it is a fact, that verbs which cannot express process can also not express purpose.

Aside from the anomaly of rain-type verbs, this subcategorization of the tests for non-stativity accounts for the following fact. There are a great number of verbs which can express purpose or not. For example, cause, annoy, persuade, frighten. Thus there are sentences in which these verbs appear which are ambiguous in having either an agentive or a non-agentive interpretation. For example,

John frightened the baby.

When ambiguous sentences of this sort are subjected to the A-tests, however, the ambiguity disappears.

Harry persuaded John to frighten the baby.

When they are subjected to the P-test, the ambiguity remains.²

John was frightening the baby.

²There seems to be an intonational difference in the two senses. The non-purposive sense requires stronger stress on the verb (but not contrastive stress). Compare

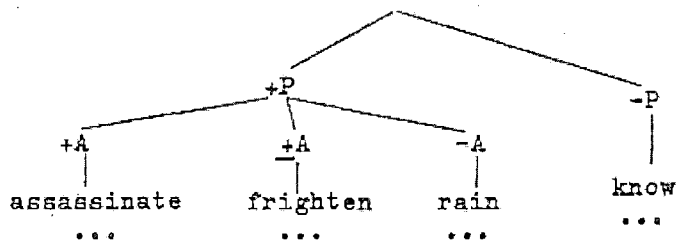
The sky was frightening the baby.

??The sky was frightening the baby.

We say, then, that frighten and other such verbs possess the property P, but either possess the property A or not. This gives rise to the ambiguity. In a context which demands the A property, the -A variety of frighten is disallowed, thus only one reading is possible.

Notice that it would not do to say that there are two verbs frighten, one of which is non-stative, the other stative, because both varieties of frighten satisfy the P-tests and are therefore non-stative.

There are, of course, verbs which do not display this ambiguity and pass both groups of tests. Such verbs are assassinate, eat, try. We have the following classification of verbs, according to whether they possess the properties A and P:



Let us now discuss appropriate designations for the properties A and P. With some misgivings I retain the term 'non-stative' for P. The term is perhaps not entirely felicitous, since the semantic property associated with P is process, and there are verbs, e.g. hear, which do not express states, yet usually do not express processes either. Another misgiving is occasioned by uncertainty as to whether P is most properly referred to as inhering in the verb. Fortunately, resolving these matters does not appear to be crucial for the present investigation.

The property A has to do with purposiveness and has something to do with both the verb (or the whole predicate) and its subject. For example, to say that John ate expresses purpose implies that John refers to a thinking being and that eat refers to a purposeful action. Sentences with the property A are limited as to their subjects as well as to their verbs. If we wish to "localize" A, then, we have two choices. A can be made a property of subjects or verbs. With the former choice an appropriate name for A is 'agent'; with the latter

choice we would use 'purposive'. Shall we then speak of subjects as 'agents', or of verbs as 'purposive'? I choose the term 'agent' for the four reasons below.

First, ascribing a feature +purposive to verbs would mean that we must represent, e.g. frighten as two distinct verbs: [FRIGHTEN, +purposive] and [FRIGHTEN, -purposive]. There will be a very large number of such pairs of verbs in which phonological form is the same for each member of the pair, and the meaning is very nearly the same, differing systematically. This mode of representation seems very awkward, since the close relationship between the members of each pair cannot be displayed in any direct fashion.

Second, ascribing the agent property to noun phrases is the stronger theory. If we use agents, we must mark those non-stative verbs which must have an agent as subject as well as those which may not take an agent. We need say nothing in this regard about frighten, which will be represented as a single verb which is indifferent as to the nature of its subject. Then we predict the absence of any pairs of verbs such that one member of the pair requires an agent and the other disallows an agent, the meanings of the verbs being otherwise identical. This situation could of course be handled, but it is not expected. So far as I know, there are no such pairs of verbs. (Convince/believe is not such a pair, since convince need not take an agent.)

Third, there is evidence to suggest that there is only one verb frighten. This is the fact that frighten in a sentence with an agent can delete frighten in a sentence without an agent and the other way around.

John was able to frighten the baby more thoroughly
than the statue ever did.

The statue frightened the baby more thoroughly
than John was ever able to.

The fourth consideration is heuristic in nature. The notion agent appears more analyzable than the feature agentive.

At least a partial analysis of agent will be given in section 10.

We return now to manner adverbs. The manner adverbs which require animate subjects provide one of the A-tests. We will say then that these manner adverbs occur only with agents. It seems true that manner adverbs in general, including those that allow inanimate subjects, only occur in sentences which express process. Hence the restriction on manner adverbs is that they occur with non-stative verbs. Ability to occur with manner adverbs like quickly can be regarded as another P-test. We have for example,

John sliced the salami quickly.

but

*John knew Sanskrit quickly.

*That entailed a strange fact quickly.

*John heard the jet quickly.

To summarize, the categorization stative/non-stative is given by a number of tests. If a verb can co-occur with any manner adverb, the verb is non-stative. Still, the distribution of the subclass of manner adverbs that require animate subjects is different from the distribution of manner adverbs in general, and the difference is not adequately expressed by the animate subject requirement. We must instead refer to agents. This difference extends to the other tests for non-stativity.

There are undoubtedly many problems connected with the broader generalization that manner adverbs only occur with non-stative verbs. It appears to me that the distinction between the two groups of tests for non-stativity would be necessary in any event.

There is one problem which at least deserves mention. We would expect, parallel with the verbs, a third class of manner adverbs--those which would not allow agents. It might be thought that adverbs which expressly disavow purpose, like

inadvertantly, accidentally, are such. However these adverbs can occur with verbs which require agents.

John ate an olive inadvertantly.

?John inadvertantly ate.

Perhaps you will agree with me that there is something a bit odd about such sentences. More normal seems to be

John inadvertantly ate an olive.

What seems to be going on is that there are differences in the scope of a manner adverb correlated in some obscure fashion with where it comes in the sentence. In the above sentence the inadvertance was committed with respect to the olive, not the eating. In other cases such manner adverbs imply a purpose that has nothing to do directly with either the subject or the verb. For example,

That happened accidentally.

The train accidentally went off the tracks.

I received the package accidentally.

Perhaps these adverbs are restricted to sentences which express events. For an illuminating and extremely discouraging discussion of such problems, see J. Austin's article "A Plea for Excuses" (in Philosophical Papers, Oxford; 1961, pp. 123-152).

3. By-clauses.

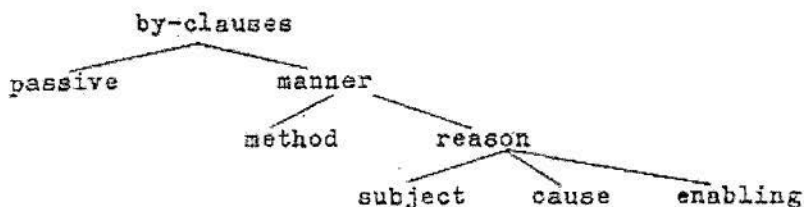
In order to avoid problems connected with manner adverbs in general, we will discuss only manner adverbs of a particular form; that is, by-clauses. By-clauses consist of by and a factive nominal in -ing. For example, by shooting him in

John assassinated the Premier by shooting him.
is a by-clause.

In fact, we will not even be able to discuss by-clauses in general, but will discuss only two kinds of by-clauses, which we term 'subject' and 'method' by-clauses. The task of this section is to delineate these two types of by-clauses; that is, to show that they are syntactically and semantically

distinct from each other, and from other types of by-clauses.

The following chart summarizes the different types of by-clauses:



In explicating this chart, we will start at the bottom with 'enabling' by-clauses. Examples of 'enabling' by-clauses are the following:

John overheard the conversation by having his ear to the door.

John avoided the draft by being eight feet tall.

John beat Harry at swimming by wearing fins.

Characteristically, sentences with 'enabling' by-clauses have paraphrases with the verb enable.

Having his ear to the door enabled John to overhear the conversation.

John's being eight feet tall enabled him to avoid the draft.

Wearing fins enabled John to beat Harry at swimming.

Succeed in + ing can be interpolated into a main sentence which contains an 'enabling' by-clause without any considerable change in meaning.

John succeeded in overhearing the conversation by having his ear to the door.

John succeeded in avoiding the draft by being eight feet tall.

John succeeded in beating Harry at swimming by wearing fins.

If we consider the last three sentences to be more basic than the sentences without succeed in, then we will have achieved

three things. 1) The fact that the presence or absence of succeed in makes no difference in the meaning will be accounted for. 2) Since whatever one succeeds in doing is viewed as a success, we will have explained why 'enabling' by-clauses only occur in sentences which express success. 3) As will be seen shortly, 'enabling' by-clauses can be subsumed under the category of 'cause' by-clauses. We will then be able to account for the paraphrases with enable.

The following sentences provide examples of 'cause' by-clauses:

John broke his leg by falling down.

John received the bite by neglecting to muzzle
his dog.

John suffered greatly by being an only child.

These by-clauses give the cause for whatever is expressed in the rest of the sentence. Sentences with 'cause' by-clauses have paraphrases with the verb cause.

John's falling down caused him to break his leg.

Neglecting to muzzle his dog caused John to
receive the bite.

Being an only child caused John to suffer greatly.

There is no condition on the stativity of either the verb of the main sentence or the verb of the by-clause. Each may be either stative or non-stative, as is illustrated in the above sentences. Receive the bite is stative, while break and suffer are non-stative. Be an only child is stative, while fall down and muzzle are non-stative. Notice, however, that the main sentence may not have an agent; that is, the main sentence does not express purpose. If in the sentence,

John broke his leg by falling down.

we suppose John's breaking of his leg to have been deliberate, then the by-clause is no longer a 'cause' by-clause. The by-clause doesn't mean "cause" any longer, and the sentence cannot

be paraphrased by a sentence with the verb cause. As a result of this same restriction, verbs which require agents, like assassinate, donnot take 'cause' by-clauses. For example, the following sentences are not paraphrases.

John assassinated the Premier by shooting him

≠ Shooting the Premier caused John to assassinate him.

At first sight 'cause' and 'enabling' by-clauses seem to differ in this respect, since we get paraphrases like:

John assassinated the Premier by having a long-range rifle.

= Having a long-range rifle enabled John to assassinate the Premier.

But on the hypothesis that 'enabling' by-clauses result from the deletion of succeed in, 'enabling' by-clauses are also restricted to occurring with main sentence subjects which are not agents. This is so because succeed in does not take an agent subject.

In fact, the succeed in sentences postulated as the sources of sentences with 'enabling' by-clauses have 'cause' by-clauses.

John succeeded in overhearing the conversation by having his ear to the door.

= Having his ear to the door caused John to succeed in overhearing the conversation.

This also gives an intuitively correct account of the sentences with enable, since we can set enable one to equal to cause one to succeed in + ing.

Returning to a previous example,

John broke his leg by falling down.

we may note that the by-clause here can be interpreted either as a 'cause' or an 'enabling' by-clause, depending on whether John's breaking his leg is counted as a success. There is yet a third interpretation of this by-clause, as 'method', which we will get to later.

We turn now to 'subject' by-clauses. It is convenient for the moment to restrict the examples to by-clauses which do not

contain agents. Consider:

John annoyed Mary by being tall.

The blanket confined the explosion by being on
top of the grenade.

John delayed our departure by having locked the
door.

Characteristic paraphrases are:

John's being tall annoyed Mary.

The blanket's being on top of the grenade confined
the explosion.

John's having locked the door delayed our departure.

The term 'subject' has been chosen, because the subjects of these paraphrases are the same as the 'subject' by-clauses, except that the by is gone, and the deleted subject is restored.

It is not clear whether there is any semantic difference between 'cause' and 'subject' by-clauses. Both express causes. The difference is in the characteristic paraphrases. 'Cause' by-clauses do not have paraphrases like those cited immediately above, and 'subject' by-clauses do not have paraphrases like the paraphrases we found for 'cause' by-clause sentences. The following, for example, are unacceptable in the required sense.

*The blanket's being on top of the grenade caused
it to confine the explosion.

*Having locked the door caused John to delay our
departure.

'Subject' by-clauses are also different from 'cause' by-clauses in that 'subject' by-clauses do not occur with stative main sentence verbs. At least, I have found no exception to this generalization. We find 'subject' by-clauses with main sentence verbs of the following four classes.

I	II	III	IV
cause	prove	annoy	persuade
make	demonstrate	impress	remind
prevent	show	frighten	convince
preclude	verify	surprise	teach
necessitate	imply	discredit	order
restrict	foretell	dismay	encourage
	emphasize	please	challenge
	guarantee	alarm	force
	betray		doom

The verbs under I take a sentential object; those under II take an indirect object and a sentential object; under III, an animate object; under IV, an animate object and a sentential object. A question that seems worth investigating is what properties these verbs share, besides the ability to co-occur with 'subject' by-clauses. A conjecture comes immediately to mind. Perhaps all the verbs are causative and take sentential objects. To maintain this generalization, we would have to say that the verbs under III are defective in requiring their sentential objects to be deleted. As George Lakoff has pointed out to me, the verb interest seems to be like the class III verbs except in this regard. Interest allows the sentential object in full form.

$\left\{ \begin{array}{l} \text{Mary was annoyed at} \\ \text{*Harry annoyed Mary at} \\ \text{Mary was interested in} \\ \text{Harry interested Mary in} \end{array} \right\}$	being elected.
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'Subject' and 'cause' and 'enabling' by-clauses are all included under the category of 'reason' by-clauses. The term 'reason' was chosen because all these by-clauses express reasons. To illustrate:

John annoyed Mary by being tall. = The reason that
 John annoyed Mary was that he was tall. ('subject')
 John broke his leg by falling down. = The reason that
 John broke his leg was that he fell down. ('cause')

John overheard the conversation by having his ear to the door. = The reason that John overheard the conversation was that he had his ear to the door. ('enabling')

Another property that all 'reason' by-clauses share is that the subject of the main sentence is not an agent. This has already been shown for 'causing' by-clauses. Note that sentences with 'subject' by-clauses fail the tests for agents:

imperative: *Annoy Mary by being tall!

persuade/remind: *Harry persuaded/reminded John to annoy Mary by being tall.

carefully, etc.: *John carefully annoyed Mary by being tall.

Thus we do not find 'subject' by-clauses with main sentence verbs which require their subjects to be agents. The case where 'subject' by-clauses contain agents will be discussed below. It will be found that they do not violate this constraint.

The next category to be considered is that of 'method' by-clauses. Justification of the term lies in the fact that these by-clauses express method.

John assassinated the Premier by shooting him.

John borrowed five dollars by putting his wife as collateral.

John surrendered by throwing a rag out the window.

Sentences with 'method' by-clauses always contain agents. As may be easily verified, they satisfy the tests for agents. Moreover, 'method' by-clauses never occur when the main sentence verb is stative, since stative verbs don't take agents. Non-stative verbs which do not allow agents are also out. The sentence,

It happened by being prayed for.

cannot be interpreted as containing a 'method' by-clause. Rather here we have a 'cause' by-clause.

The sentence given above to illustrate 'method' by-clauses have agent-only verbs. The point in choosing such verbs was to reduce ambiguity by eliminating the possibility of interpreting the by-clauses as 'reason' by-clauses. The ambiguity is not entirely eliminated, however, because as was noted previously 'enabling' by-clauses can occur with agent-only verbs. The earlier example of an 'enabling' by-clause,

John assassinated the Premier by standing in line.
can also be interpreted as having a 'method' by-clause. We could imagine that the Premier had a fatal fit upon seeing John standing in line, and John intended this to happen, for example. This type of ambiguity disappears, though, when one of the tests for agents is applied. There is only one interpretation of

Harry persuaded John to assassinate the Premier by
standing in line. (Where John is the understood
subject of stand.)

The interpretation as an 'enabling' by-clause disappears, thus supporting our contention that sentences with agents may not also have 'reason', including 'enabling' by-clauses. It may seem a contradiction to say that the subject of a sentence with an agent-only verb is not an agent, but it isn't really. What we are saying is that in case the sentence has an 'enabling' by-clause, the agent-only verb is not the main verb. The main sentence verb is really succeed in. The situation is similar to that obtaining with the perfect have. The subject of a sentence in the perfect is never an agent, even though the 'main verb' may be an agent-only verb. Notice:

John assassinated the Premier.

*Have assassinated the Premier!

In this same connection another important property of 'method' by-clauses may be mentioned. In addition to the requirement that the main sentence contain an agent, a 'method' by-clause must itself contain an agent. 'Enabling' by-clauses

do not have this requirement. Therefore, a sentence whose main verb is an agent-only verb and which contains a by-clause with a stative verb has only one interpretation; the by-clause is unambiguously 'enabling'.³ E.g.,

John assassinated the Premier by being first in line.

John borrowed five dollars by knowing the ins and
outs of high finance.

John surrendered by being able to satisfy his comrades
that it was the right thing to do.

³Some people don't get 'enabling' interpretations at all when the main sentence verb is one that requires an agent. I don't know why. The analysis of 'enabling' by-clauses is not a central concern for the present investigation, so if the reader finds the sentences with them unacceptable, he should not on that account feel prejudiced against the main conclusions of this paper.

Since these sentences contain 'enabling' by-clauses, and since 'enabling' by-clauses do not occur when the main sentence subject is an agent, we expect the sentences to fail the tests for agents. They do.

*Assassinate the Premier by being first in line!

*Harry persuaded John to assassinate the Premier by
being first in line. (Where the by-clause
subject is John.)

*John methodically assassinated the Premier by being
first in line.

Another way to tell 'method' and 'reason' by-clauses apart is the ability of 'reason' by-clauses to be preposed to the beginning of the sentences. 'Method' by-clauses cannot be preposed. One can also change around sentences with 'reason' by-clauses so that the by-clause becomes a main, finite sentence while the former main clause becomes non-finite and subordinate. The by-clause is represented at the beginning of the former main clause by thereby. First we will illustrate the preposability

of 'reason' by-clauses.

By being first in line John assassinated the Premier.
('enabling')

John was first in line, thereby assassinating the
Premier.

By falling down, John broke his leg. ('cause')
John fell down, thereby breaking his leg.

By being tall John annoyed Mary. ('subject')
John was tall, thereby annoying Mary.

The examples given for 'method' by-clauses, recall, were ambiguous in having either a 'method' or an 'enabling' interpretation. When the by-clauses are preposed, the 'enabling' interpretation is the only possible one (and one has to strain to get even that, sometimes).

By shooting him John assassinated the Premier.
John shot the Premier, thereby assassinating him.

By putting his wife as collateral John borrowed five
dollars.

John put his wife as collateral, thereby borrowing
five dollars.

By throwing a rag out the window John surrendered.

John threw a rag out the window, thereby surrendering.

With a manner adverb that requires an agent, these sentences are unacceptable.⁴

⁴The fact that some by-clauses cannot be preposed was pointed out to me by John Ross. Care should be taken to give these sentences "normal" intonation, because heavy stress or pauses alter acceptability judgments in ways I don't know how to predict.

*By shooting him John methodically assassinated
the Premier.

We will now return to 'subject' by-clauses and consider sentences where the by-clause contains an agent. This was postponed because such sentences are in general ambiguous. The by-clause can be interpreted either as a 'subject' or as a 'method' by-clause. Consider the sentence

John annoyed Mary by breaking the dish.

Suppose that breaking the dish was intentional. Then the by-clause contains an agent. Now the whole sentence is ambiguous, either expressing purpose or not. If it does not express purpose, the main sentence subject, John, is not an agent, and so we are dealing with a 'subject' by-clause. If John is an agent, we have a 'method' by-clause. This observation can now be tested in several ways. Starting from the observed ambiguity of the sentence, we observe that it loses this ambiguity when submitted to any of the agent tests. E.g.,

Annoy Mary by breaking the dish!

Now, the by-clause is only 'method'. When the by-clause is preposed, we should get only the 'subject' interpretation.

By breaking the dish John annoyed Mary

John broke the dish, thereby annoying Mary.

The prediction seems to me to be borne out.

By-clauses which are interpretable as 'subject' are also interpretable as 'method' unless some of the requirements for 'method' by-clauses are not met. If either the main sentence or the by-clause does not have an agent, or if the by-clause is preposed, then the 'method' reading is out. An instance where the main sentence does not have an agent is provided by the verb necessitate, whose subject cannot be an agent.

John necessitated our withdrawal from the fence
by coughing.

*Harry persuaded John to necessitate our withdrawal
from the fence by coughing. (Where John, not
Harry, is the understood subject of cough.)

The following chart summarizes what has been said so far about the four types of by-clauses.

	'enabling'	'cause'	'subject'	'method'
Main sentence subject is an agent	-	-	-	+
Main sentence verb is stative	+	+	-	-
<u>By</u> -clause subject is an agent	+	+	+	+
<u>By</u> -clause verb is stative	+	+	+	-

The plus, of course, means "yes"; the minus means "no". The terms 'main sentence subject' and 'main sentence verb' refer to surface constituents; that is, the claim that the main sentence subject is not an agent when there is an 'enabling' by-clause does not depend on the theory that succeed in is deleted. There is no agent, because sentences with 'enabling' by-clauses fail the agent tests. Similarly, it is claimed that the main sentence verb in sentences with 'enabling' by-clauses can be stative or non-stative. This would not be true before succeed in is deleted, since succeed in is stative. If the theory about the deletion of 'succeed in' is correct, and if we classified by-clauses before this deletion takes place, then the 'enabling' by-clause column would be eliminated entirely and subsumed under 'cause' by-clauses.

In the diagram given at the beginning of this section, 'method' and 'reason' constitute the category 'manner'. The motivation for this is that both types express manner. To see this more clearly, notice that 'method' and 'reason' by-clauses can both be questioned by how. For each type of by-clause:

How did John avoid the draft? By being eight feet tall.

= What enabled John to avoid the draft? ('enabling')

How did John break his leg? By falling down.

= What caused John to break his leg? ('cause')

How did John annoy Mary? By being tall.

= What annoyed Mary? ('subject')

How did John assassinate the Premier? By shooting him.

= By what method did John assassinate the Premier?
('method')

In view of this, it seems appropriate to call these by-clauses manner adverbs. 'Passive' by-clauses, however, are not manner adverbs, since they do not express manner and cannot be questioned with how. The following examples illustrate 'passive' by-clauses and the fact that they cannot be questioned.

John was annoyed by Harry's setting fire to the house.

How was John annoyed? *By Harry's setting fire to
the house.

Their departure was delayed by John's locking the
door.

How was their departure delayed? *By John's locking
the door.

John was overwhelmed by having been chosen as
secretary.

How was John overwhelmed? *By having been chosen as
secretary.

Another difference between 'passive' and 'manner' by-clauses is that the subjects of 'passive' by-clauses can be expressed and can be different from the main sentence subject, as is shown above. This is not true of 'manner' by-clauses, with certain exceptions that will be noted in section 5.

It seems fairly obvious that 'passive' by-clauses result from application of the passive transformation to a sentence with a sentential subject. The sources of the above sentences with 'passive' by-clauses are thus

Harry's setting fire to the house annoyed John.

John's locking the door delayed their departure.

Having been chosen as secretary overwhelmed John. The fact that 'passive' by-clauses cannot be questioned with how is explicable on the assumption that only deep structure constituents can be questioned. Since the by is added by transformation, 'passive' by-clauses are not deep structure constituents. By this reasoning 'manner' by-clauses are deep structure constituents. So any attempt to derive 'passive' and 'manner' by-clauses in the same way must fail.

There is another way in which the different status of 'passive' and 'manner' by-clauses is reflected. We have seen that there are a number of restrictions on the occurrence of 'manner' by-clauses with respect to the subject and verb of the main sentence and the by-clause. None of these restrictions applies to 'passive' by-clauses. The 'passive' by-clause subject can be an agent or not, and the by-clause verb can be stative or non-stative. The main sentence verb can also be stative or non-stative (entail vs. annoy). Of course, the subject cannot be an agent, but this is automatic.

Having given various ways to differentiate the different types of by-clauses, we will henceforth confine ourselves to 'method' and 'subject' by-clauses. The categories 'method' and 'subject' by-clause correspond to the categorization of manner adverbs discussed in section 2. 'Method' by-clauses are manner adverbs that require agents, like enthusiastically, carefully. Manner adverbs like quickly, gradually do not require agents, and in this they are like 'subject' by-clauses. But quickly, etc., do allow agents, while 'subject' by-clauses do not. So another way to look at it is that 'subject' and 'method' by-clauses taken as a single category are like quickly, etc. in occurring with or without an agent. In section 10 it will be argued that 'subject' and 'method' by-clauses do constitute a single category, but in the meantime we will focus on the differences between them.

4. The like-subject requirement.

We have progressively narrowed the scope of our inquiry from how purpose is represented in deep structures to the relationship of agents to 'method' and 'subject' by-clauses. We herewith restrict our attention to a consideration of one peculiar fact about these two types of by-clauses. This is that the understood subject of the by-clause is the same as the main sentence subject. In this section we will enumerate various thinkable ways of accounting for this fact.

First, to the fact. Sentences in which the like-subject condition is not fulfilled are unacceptable.

*John assassinated the Premier by Harry's shooting him. ('method')

There is some question as to whether this sentence is interpretable as containing an 'enabling' by-clause. I myself find it unacceptable under any reading, but at least it seems clear that the 'method' reading is no good.

*John annoyed Mary by Harry's being tall. ('subject') Again, perhaps there is an 'enabling' interpretation. I think not. In any case, the reading as 'subject' by-clause is impossible.

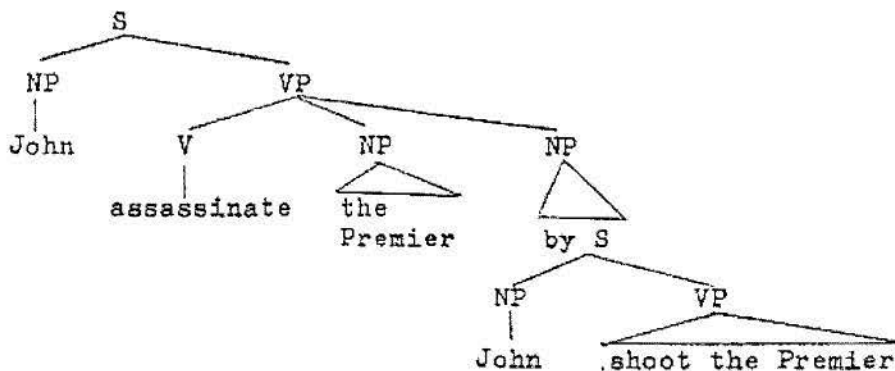
How, then, can this like-subject requirement be expressed? First, notice that whatever solution we choose, at some point in the derivation the subject of the by-clause must be present, even if it must later be deleted. Otherwise, there would be no formal way to characterize the notion "understood subject of the by-clause." We can easily determine that there is an understood subject and in any particular instance, we can determine what it is. This intuition must be taken into account. If it were said that the by-clause had no subject at any place in the derivation, some formal device that is not provided for in current transformational theory would have to be found to characterize what is "understood."

There seem to be two feasibilities for expressing the like-subject requirement. The first is postulating some constraint on sentences with 'method' and 'subject' by-clauses that blocks derivations in which the subjects are different. The second is to postulate a transformation that moves or copies something. Let's look at the first alternative.

There are several forms a constraint that blocks unlike subjects could have. It could be a constraint on deep structures, on surface structures, or a transformational constraint. For an account of what part deep and surface constraints play in grammar, see Perlmutter (op. cit.). George Lakoff has shown how obligatory identity may be accounted for by requiring deep structures to meet the structural descriptions of deletion transformations (see Lakoff, On the Nature of Syntactic Irregularity, NSF-16, Harvard Computation Laboratory, 1965, section V.) Whatever the nature of the constraint, such a solution supposes that the subjects are distinct in deep structure. To constrain two things to be identical there must be two things. Of course there might be such a constraint, even if the two subjects are not distinct in deep structure, that is if one of the subjects arose by moving or making a copy of the other. In the latter case, however, we would not say that the constraint had accounted for the like-subject requirement, so it would not be a "solution."

Making the assumption that the deep structures of sentences with the by-clauses correspond fairly directly with their surface structures, we can see what sort of deep structure the constraint solution entails. The sentence,

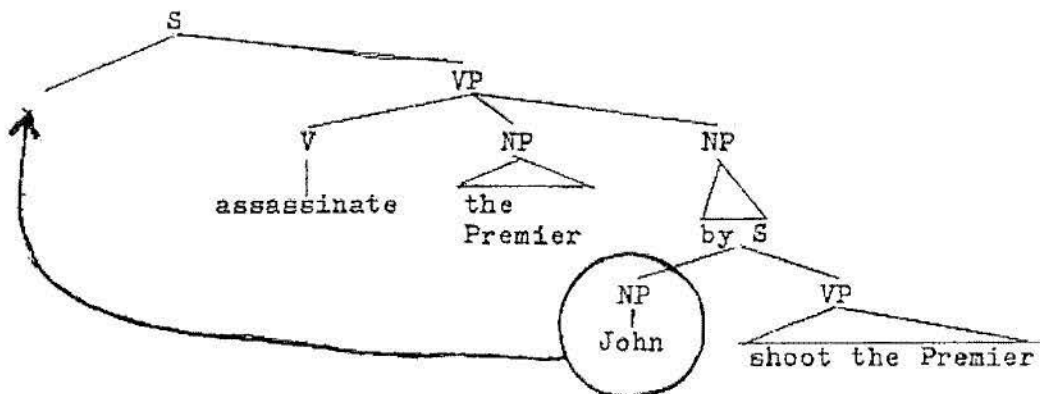
John assassinated the Premier by shooting him.,
would have the deep structure



(Tenses of verbs are not taken into account.)

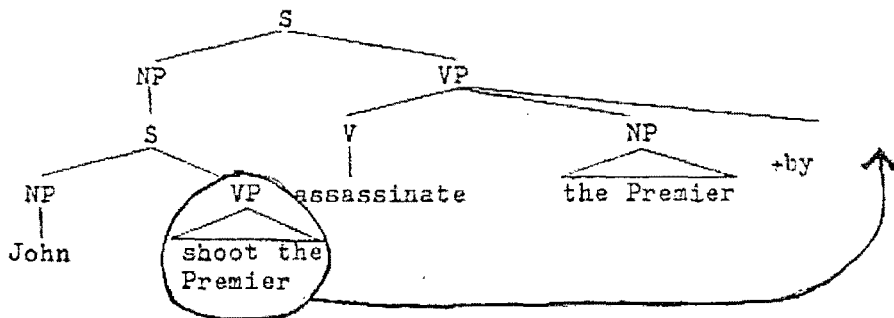
Since both subjects, John and John, are present in this deep structure, let us call the postulation of this sort of deep structure, along with whatever constraint and deletion transformation may be found appropriate, the 'two noun phrases solution'.

If the two subjects are not distinct, a simple solution is to posit a movement transformation and the following deep structure:



As the arrow indicates, John will be moved up from the by-clause to become the main sentence subject. This will be called the 'no subject solution.'

An equally simple solution is to start with



and to move the verb phrase of the sentential subject as indicated, prefixing it with by. We term this the 'abstract subject solution.'

Each of these three solutions uses only one transformation. Allowing more transformations multiplies the possible deep structures rapidly, so, preferring to let complications be forced on us by the facts, we will go no further in listing possible solutions. It is assumed henceforth that the two noun phrases solution, the no subject solution, and the abstract subject solution exhaust the possibilities. The only problem then is to choose among them. Of course, strictly speaking, this assumption is indefensible, but we may hope that more correct assumptions about deep structures will make no essential difference for the arguments that follow. In other words, the arguments to be given actually apply to families of solutions, and we hope that the conjunction of these families contains "the" correct solution.

Notice that the abstract subject solution has the most initial promise, for 'subject' by-clauses, at least. The characteristic paraphrases of sentences with 'subject' by-clauses can be accounted for, simply by making the transformation that moves the verb phrase optional. We will find, however, that the abstract subject solution is the only solution among the three that is to be rejected altogether.

The argument will proceed as follows. Section 5 discusses 'method' by-clauses. It is shown that the subjects must be guaranteed to be identical before any cyclical transformations apply. We then present evidence that the two noun phrases solution is correct for 'method' by-clauses.

Section 7 discusses 'subject' by-clauses. We show that the two noun phrases solution and the abstract subject solution are incorrect for 'subject' by-clauses.

5. 'Method' by-clauses.

The problem is to decide which of the solutions--two noun phrases, abstract subject, or no subject--is the correct one for 'method' by-clauses. Whichever solution we choose we must account for the fact that the following two sentences are paraphrases:

Someone assassinated the Premier by shooting him.

= The Premier was assassinated by being shot.⁵

⁵The existence of such "double passives" and the "single passive" cases discussed below were pointed out to me by John Ross.

It is apparent that the by-clause of the second sentence is not a 'passive' by-clause. If this by-clause were derived by application of the passive transformation, we would expect

*Being shot assassinated the Premier.

to be acceptable. In addition, by being shot can be questioned with how:

How was the Premier assassinated? By being shot.

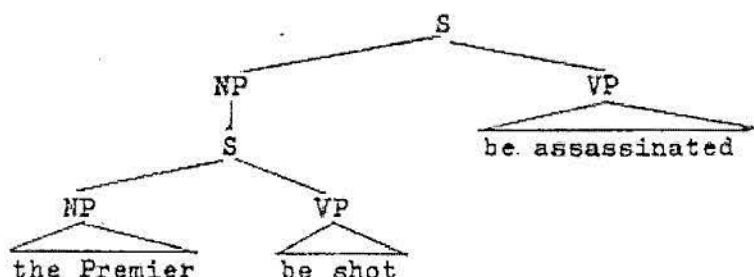
Therefore it cannot be a 'passive' by-clause.

Consider now the derivation of

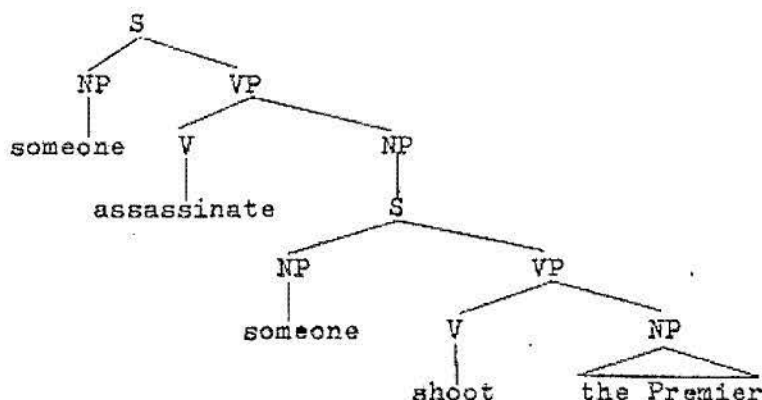
The Premier was assassinated by being shot.

Suppose that the abstract subject solution is correct. Then

to account for the fact that the understood subject of be shot is the Premier, we postulate:



A movement transformation converts this into the correct surface structure. But this cannot be the deep structure, since be shot and be assassinated are clearly passive. The ultimate source of the above tree must be:

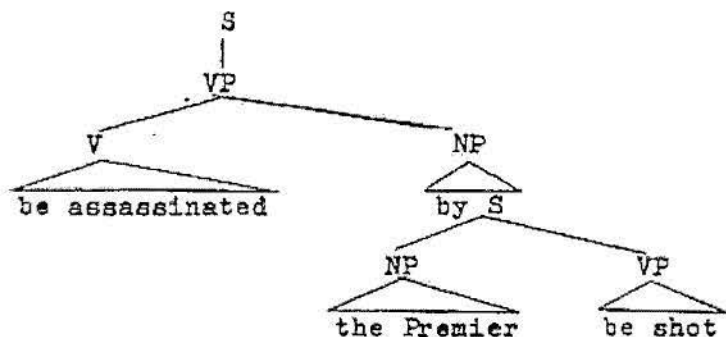


This is clearly wrong, since the object of assassinate must be the Premier. Even if this were not clear, this deep structure is different from the deep structure that would underlie

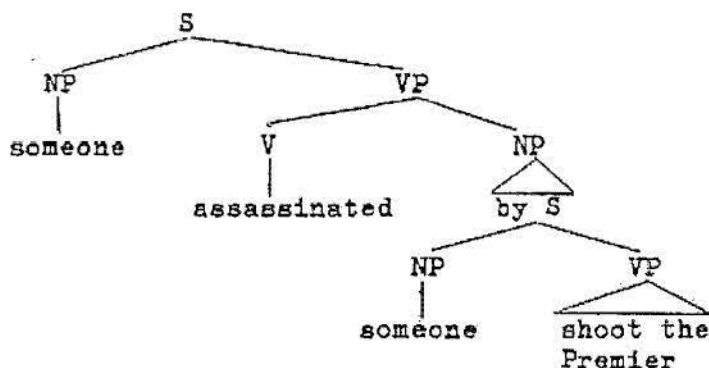
Someone assassinated the Premier by shooting him, still assuming the abstract subject solution to be correct. Thus this solution leads to an incorrect result.

Similarly we can show that the no subject solution does not account adequately for "double passive" sentences. If

the no subject solution were correct, the structure underlying
 The Premier was assassinated by being shot.
 would be

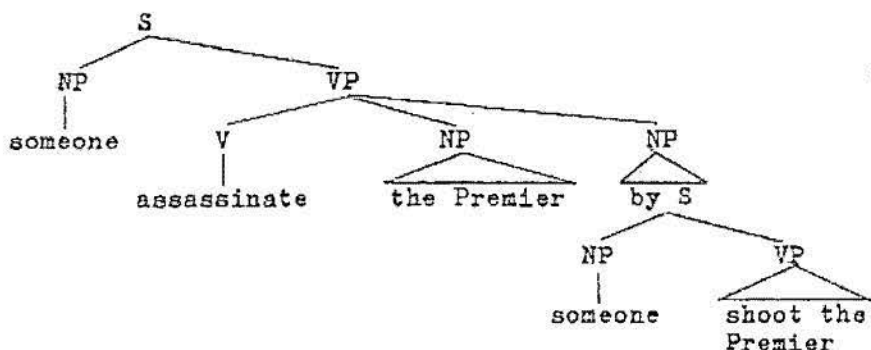


Undoing the results of the passive transformation, we get:



Again, the Premier is not the object of assassinate, and the active and passivized sentences cannot be shown to have the same deep structure.

The two noun phrases solution, on the other hand, gives the same deep structure for both the active and the double passive cases, namely:



Deletion of the by-clause subject (and nominalization of the by-clause) gives directly the surface structure of

Someone assassinated the Premier by shooting him.

Applying the passive transformation to the by-clause and the main sentence, then deleting the by-clause subject (and by someone twice) gives the surface structure of

The Premier was assassinated by being shot.

To conclude, however, that the two noun phrases solution is the right one would be premature.

Consider the transformation that deletes the subject of the by-clause--call it 'subject-deletion'. The antecedent of the deletion is the main sentence subject. The antecedent could not be the object, for example, because then the subject of the by-clause in

?Someone assassinated the Premier by shooting himself. could be the Premier. But this is an impossible interpretation. Now in

The Premier was assassinated by being shot.

the antecedent for subject-deletion, the Premier, is not the main sentence subject until after the passive transformation has applied to the main sentence. Therefore subject-deletion follows the passive transformation. Since the passive

transformation is cyclical, subject-deletion cannot be pre-cyclical.⁶

⁶That the passive transformation is cyclical is shown by Lakoff in "Deep and Surface Grammar" (unpublished, 1966). He also discusses the possibility of pre-cyclical and last-cyclical transformations and shows, in fact, that such exist.

It can be shown that sentences with 'method' by-clauses must meet the structural description of subject-deletion. If these sentences are marked to meet the structural description (i.e., marked as 'positive absolute exceptions', in Lakoff's terminology), the like-subject requirement in the double passive case will be accounted for. For example, the unacceptability of

?*The Premier was assassinated by a gun's being used. is successfully predicted. This could not be accomplished by a deep structure constraint, or any mechanism that operates before the main sentence is passivized, because if the passive transformation had not applied, the above example would be perfectly acceptable. It would come out to be:

Someone assassinated the Premier by using a gun. To put it another way, the like-subject deletion transformation deletes and takes as its antecedent derived subjects. Therefore marking sentences with 'method' by-clauses as positive absolute exceptions to subject-deletion correctly accounts for the like-subject requirement.

Besides the double passive case, there is another situation in which the deleted by-clause subject is a derived, rather than logical, subject. The fronting transformation can apply to the by-clause sentence before its subject is deleted. The fronting transformation is the rule which creates certain have sentences out of source sentences which do not contain have (see Lee, op. cit.). For example, fronting changes

A book is on the table.

to

The table has a book on it.

An example of a 'method' by-clause to which fronting has applied is

The Premier was assassinated by having someone give him a poisoned aspirin.

The passive transformation and fronting have both applied to the by-clause in

The Premier was assassinated by having a poisoned aspirin given (to) him.

In these cases, as well as the double passive case, not only are the derived subjects understood to be the same, but the logical subjects of the main sentence and the by-clause are also identical. Whoever assassinated the Premier is the same person that shot him or gave him a poisoned aspirin.⁷ This

⁷We should also consider the possibility that an organization, rather than an individual, is the agent. Perhaps in this case there is no strict identity between the logical subjects of the main sentence and by-clause.

?The Premier was assassinated (by the opposition party) by being shot (by a member or a hireling of the opposition party).

If such an interpretation is possible, I don't know what to make of it. Presumably the same non-identity is possible in the active case. Compare also:

Tom, Dick, and Harry conspired to assassinate the Premier by shooting him.

If they conspired together, Tom, Dick, and Harry need not have planned for each of them to actually pull the trigger.

identity of logical subjects explains the interpretation of certain by-clauses. The by-clause in

John assassinated the Premier by being given a gun. cannot be a 'method' by-clause. This follows from the requirements that the logical and derived subjects of the main sentence

and by-clause be the same. Since the logical and derived subjects of the main sentence are both John, the source for the 'method' by-clause would have to be the unacceptable

*John was given a gun by himself.

Similarly, we can explain why the 'method' by-clause in
The Premier was assassinated by having someone give
him a poisoned aspirin.

has only one interpretation. In isolation, the sentence

The Premier had someone give him a poison aspirin.
is ambiguous. Have can either be the causative have, in which case the Premier is the logical subject, or have can be the have introduced by the fronting transformation. In the 'method' by-clause only the latter reading is possible; the Premier is not the logical subject. If the logical subject of the by-clause were the Premier, the logical subject of the main sentence would also have to be the Premier. But

*The Premier was assassinated by himself.
is unacceptable.

Now the difficulty is that we cannot handle the required identity of the logical subjects in the same way as we have accounted for the identity of the derived subjects. The identity requirement for logical subjects must be expressed while they are still subjects, in other words before the passive or fronting transformations have applied. Requiring the subject of the by-clause to be deleted by subject-deletion cannot possibly account for the identity of the logical subjects, since subject-deletion follows the passive transformation. The requirement must be expressed before the passive transformation has applied. It appears that forcing sentences with 'method' by-clauses to meet the structural description of subject-deletion is necessary, but not sufficient to account for the like-subject requirement.

The argument given at the beginning of this section for the two noun phrases solution had to do with derived subjects rather than logical subjects. We now see that all that was in fact demonstrated was that objects of the main sentence and by-clause are distinct. We still know nothing about the deep structure subject(s). We do know, however, that if either the no subject or abstract subject solutions should turn out to be correct, the movement transformation each requires to create the apparent identity of subjects would have to precede the passive transformation.

It should be pointed out that subject-deletion is not sufficient to account for the absence of by-clause subjects. Consider the sentences

The Premier was assassinated by shooting him.

John was punished by taking away his rattle.

These are exceptions to the generalization that the derived subjects are the same. Here the antecedents of the understood by-clause subjects are the logical subjects of the main sentences. The by-clause subjects cannot have been deleted by subject-deletion, since subject-deletion applies after the passive transformation. At this point the antecedents are no longer the main sentence subjects. There are the same options as before for ensuring the absence of these by-clause subjects--one of the movement transformations that go with the abstract subject and the no subject solutions, or another subject deletion transformation, which applies before the passive transformation rather than after.

Notice that sentences like the two examples above do not meet the structural description of subject-deletion, yet are acceptable. This may be merely a notational problem, or it may indicate that the appropriate way to ensure that the by-clause subject be deleted is by means of a surface constraint which blocks by-clauses with subjects. The constraint

could not be applicable to 'passive' by-clauses, which may have expressed subjects. For the present we retain the absolute exception view and assume that the structural description of subject-deletion is stated with a parenthesized subject. Thus subjectless by-clauses will meet the structural description of subject-deletion and undergo it vacuously.

Although these arguments lead to no definite conclusion, it can be inferred on other grounds that the two noun phrases solution is the correct one. With the other two solutions the surface subject and the verb of the main sentences are not constituents of the same sentence. In this case we would expect no selectional restrictions between subject and verb, since selectional restrictions seem to be limited in scope mainly to constituents of the same sentence. The fact that there are selectional restrictions is evidence for the two noun phrases solution. For instance, scatter requires a collective or plural subject:

The crowd scattered by using every available exit.
And of course, the main sentence subject must be a thing that can have a purpose, ruling out expletives.

*It assassinated the Premier by raining cats
and dogs.

The restriction to animate subjects, however, does not count as evidence, since if the subject were not animate, the by-clause would not be termed 'method'. The word method itself presupposes an agent. Similar considerations convince us that the subject and verb of the by-clause go together in deep structure.

Suppose then that the two noun phrases solution is correct. Since the main sentence and by-clause subjects are distinct in deep structure, a transformation is required to delete the by-clause subject. As was pointed out above, subject-deletion

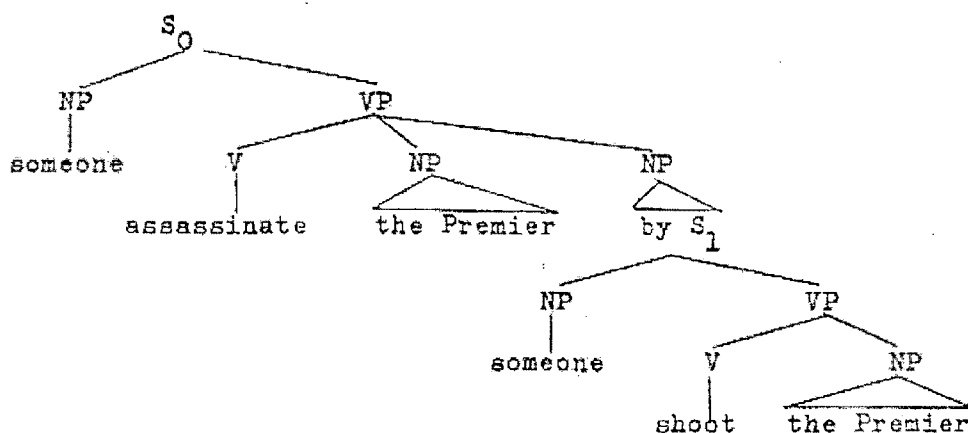
does not suffice; another transformation which does the same thing as subject-deletion is needed. Call this transformation 'pre-subject-deletion'. Although it is not very compelling evidence, the existence of pre-subject-deletion seems to indicate the appropriate way to constrain the logical subjects to be identical. We can require sentences with 'method' by-clauses to meet the structural description of pre-subject-deletion, just as they must meet the structural description of subject-deletion. A deep structure constraint is of course still feasible, but at this point I think it is legitimate to doubt the existence of such constraints. The matter will be brought up again in section 9.

Notice that for the proposed solution to work, pre-subject deletion must be a precyclical transformation. If it were cyclical, the following derivation would be possible:

	Someone assassinated the Premier by the Premier shoot someone
S_1 , passive:	Someone assassinated the Premier by someone be shot by the Premier
S_0 , pre-subject-deletion:	Someone assassinated the Premier by be shot by the Premier
S_0 , passive:	The Premier was assassinated by someone by the shot by the Premier
other rules:	*The Premier was assassinated by being shot by him.

To summarize, we give the derivation of

The Premier was assassinated by being shot.



precycle

pre-subject-deletion: Someone assassinate the Premier.
by shoot the Premier.

cycle

S₁, passive: Someone assassinate the Premier
by the Premier be shot.⁸

S₀, passive: The Premier be assassinated by
someone by the Premier be shot.

S₀, subject-deletion: The Premier be assassinated by
someone by be shot.

other rules: The Premier was assassinated by
being shot.

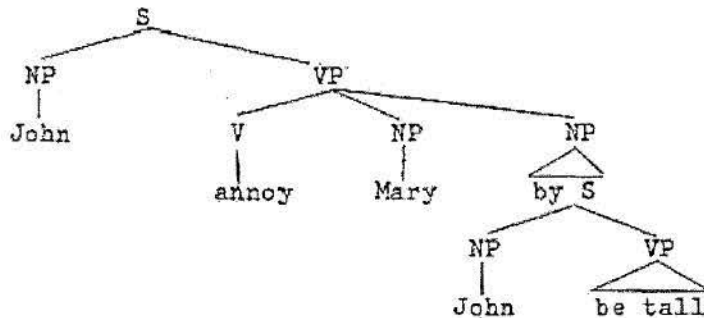
⁸ We have supposed that the passive transformation can apply to a subjectless sentence.

6. 'Subject' by-clauses.

We will now consider how to account for the like-subject requirement with 'subject' by-clauses. We first show that the solution chosen for 'method' by-clauses is inappropriate for 'subject' by-clauses.

Supposing the two noun phrases solution to be correct for 'subject' by-clauses, the main sentence subject and the by-clause subject will be the deep structure subjects of the main sentence and by-clause, respectively. For example,

John annoyed Mary by being tall.
will have the deep structure:



But the understood subject of the by-clause is not, in general, the deep structure subject; nor is the main sentence subject there in deep structure. Consider the sentences:

John annoyed them by seeming to disregard their opinions.

John surprised us by being easy to please.

The car delayed our departure by beginning to act up.

John impressed us by seeming to begin to be easy to please.

In each of these sentences the deep structure subject of the by-clause is a sentential noun phrase. These subjects would be approximately the following:

John disregard their opinions.

Someone please John.

[[Someone please John] be easy] begin.

Thus although the understood subjects of the by-clauses in these examples are simple noun phrases, the deep structure subjects

are more complicated. Therefore the understood subjects are not deep structure subjects of the main verb.

Furthermore, if the identity of subjects in

John impressed us by seeming to begin to be easy
to please.

were to be accounted for by requiring this sentence to undergo pre-subject-deletion, this would imply that certain transformations precede pre-subject deletion; namely the transformations which convert

[[[Someone please John] be easy] begin] seem.

to

John seemed to begin to be easy to please.

These transformations would then have to be precyclical, since pre-subject-deletion is precyclical. This is certainly a false conclusion. For example, the transformation⁹ which

⁹'it-replacement'. See Rosenbaum, The Grammar of English Predicate Complement Constructions, MIT Press, 1967.

converts the structure underlying

The vat's being filled slowly began.

to the structure underlying

The vat slowly began to be filled.

must follow the passive transformation in order of application. By the same token these transformations would have to precede the movement transformation associated with the abstract subject and no subject solutions. That is, if we decide on one of these solutions, the movement transformation it entails will have to be cyclical.

The noun phrase which appears as the main sentence subject is revealed not to be the deep structure subject by the absence of selectional restrictions between it and the verb of the main

sentence. With some exceptions to be discussed later, any noun phrase whatever may be the surface subject of verbs like annoy which take 'subject' by-clauses. The exceptions do not involve violation of selectional restrictions. However there may be selectional restrictions between the understood subject and the verb of the by-clause. This is predicted by the abstract subject and no subject solutions.

Further evidence that the main sentence subject is not a deep structure subject is provided by the sentence

It annoyed John by raining all day.

It should be said at the outset that there are many speakers of English who do not accept this sentence, or sentences like it. For some, including me, it is perfectly acceptable. The thing to note is that the it is not a pronoun replacing some definite noun phrase, as is shown by the unacceptability of

*The weather annoyed John by raining all day.

Rather the it is the expletive associated with meteorological expressions, like rain. This meteorological it must not be introduced into deep structure as the subject of a verb like annoy, which is not meteorological. The appearance of this it as the subject of annoy in the above example is plainly due to the fact that the by-clause contains a meteorological predicate. Without the by-clause, it is interpreted as the definite pronoun:

It annoyed John.

People who do not accept meteorological it with a 'subject' by-clause seem to interpret

It annoyed John by raining all day.

in the same way I interpret

*John was annoyed at it for raining all day.

This leads one to suspect that the sentence

John annoyed Mary by being tall.

has two distinct readings. Either Mary was annoyed at John

personally (in which case she was being rather unreasonable), or she was merely annoyed at the fact that he was tall. In the latter reading only, is there a paraphrase relation with

John's being tall annoyed Mary.

There are probably some special restrictions on meteorological it for all speakers. Much worse for me than

It annoyed John by raining all day.

is

*It persuaded John not to have the picnic by raining cats and dogs.

In any case, there is enough evidence to support the conclusion that the two noun phrases solution is wrong for 'subject' by-clauses. We must now choose between the two remaining alternatives--the abstract subject and the no subject solutions.

In the no subject solution the by-clause is a deep structure constituent, while in the abstract subject solution it is not--the by is added by transformation. We were able to explain why 'passive' by-clauses cannot be questioned by assuming that only deep structure constituents can be questioned. Since 'subject' by-clauses can be questioned with how, this assumption forces us to choose the no subject solution. Similarly, the restriction that 'subject' by-clauses, like 'method' by-clauses, only occur with non-stative verbs leads us to believe that 'subject' by-clauses are deep structure constituents. If we choose the no subject solution, this restriction falls together with the restriction on 'method' by-clauses and manner adverbs in general. (As we will see in section 10, 'cause' and enabling' by-clauses are not exceptions to this.) If, on the other hand, we chose the abstract subject solution, we would have to explain somehow why

John's having appointed his brother smacks of nepotism.

John's having red hair ties in with his pugnacity.

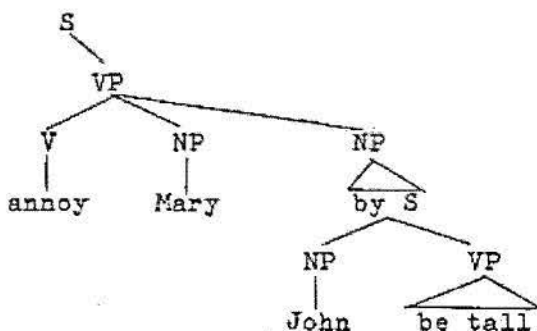
cannot be converted to

*John smacks of nepotism by having appointed his brother.

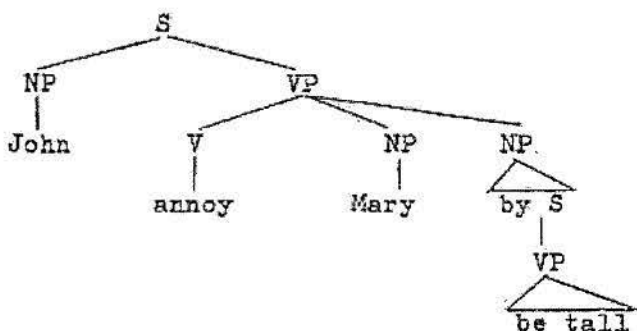
*John ties in with his pugnacity by having red hair.

We conclude that the no subject solution is correct. The transformation that moves the by-clause subject up to become the main sentence subject we will call 'extraction'. As was noted above, extraction is a cyclical transformation. Another transformation is required for shifting the entire by-clause into subject position. This transformation, which we term 'adverb-to-subject', accounts for the characteristic paraphrases of sentences with 'subject' by-clauses. We assume that by is deleted by an independently motivated rule.

To summarize the conclusions of this section, we give the following derivations.

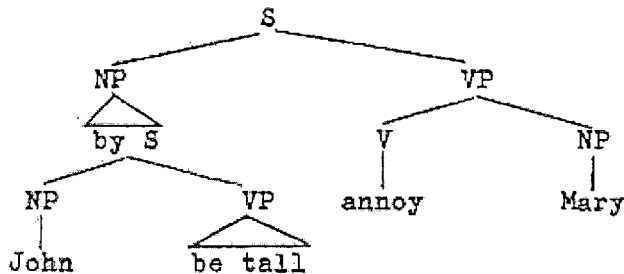


extraction:



other rules: John annoyed Mary by being tall.

When applied to the same deep structure, adverb-to-subject gives



Deletion of by and nominalization gives

John's being tall annoyed Mary.

The adverb-to-subject rule is like Fillmore's rule that preposes instrumental adverb (Fillmore, op. cit.), as in

The hammer broke the window.

where the hammer is an instrument.

Additional justification for the conclusions of this and the preceding section are given in section 7.

7. Cross-over evidence.

In a sentence with a 'subject' by-clause, the subject and object of the main sentence may not be coreferential. The following are examples of 'subject' by-clauses:

- John reminded Mary to pick up lettuce by having his fingers crossed.
- = John's having his fingers crossed reminded Mary to pick up lettuce.

- John satisfied the doctors that he was drugged by feeling no pain.
- = John's feeling no pain satisfied the doctors that he was drugged.

- John persuaded Mary to drive home by being drunk.
- = John being drunk persuaded Mary to drive home.

They persuaded the guide that they were lost by coming across their own footprints.

= Their coming across their own footprints persuaded the guide that they were lost.

When the object is replaced by one coreferential with the subject, the by-clause sentences lose their acceptability, although the paraphrases are still okay.

*John reminded himself to pick up lettuce by having his fingers crossed.

John's having his fingers crossed reminded him to pick up lettuce.

*John satisfied himself that he was drugged by feeling no pain.

John's feeling no pain satisfied him that he was drugged.

*John persuaded himself (not) to drive home by being drunk.

John's being drunk persuaded him (not) to drive home.

*They persuaded themselves that they were lost by coming across their own footprints.

Their coming across their own footprints persuaded them that they were lost.

The unacceptability of these by-clause sentences can be accounted for by Postal's cross-over principle (P. Postal, "The Cross-Over Principle," unpublished, 1968). The cross-over principle says that in certain situations it is forbidden to move a noun phrase over a noun phrase coreferential with the noun phrase being moved. Since in our formulation the subject of the by-clause is moved over the object by extraction, the unacceptability of those by-clause sentences is satisfactorily handled. The important point is that if we were to choose either the

abstract subject or the two noun phrases solution such an explanation would not be forthcoming. In neither of these solutions has the main subject been moved.

Several other facts follow from the impossibility of moving the by-clause subject over a coreferential main sentence object. 'Subject' by-clauses can also be interpreted as 'method' by-clauses if the by-clause can have an agent and the main sentence subject can be an agent. So changing the verbs of the by-clauses in the first examples to non-stative verbs which take agents makes the sentences ambiguous.

John reminded Mary to pick up lettuce by crossing
his fingers.

John satisfied the doctors that he was drugged by
looking at his pupils.

John persuaded Mary to drive home by feeling his
pulse.

They persuaded the guide that they were lost by
studying the map.

When the object is changed to a coreferential one, this ambiguity disappears; the interpretation of the by-clause is as 'method'.

John reminded himself to pick up lettuce by crossing
his fingers.

John satisfied himself that he was drugged by
looking at his pupils.

John persuaded himself (not) to drive home by feeling
his pulse.

They persuaded themselves that they were lost by
studying the map.

The fact that the 'method' interpretation is possible confirms the choice of the two noun phrases solution for 'method' by-clauses; in the two noun phrases solution the subject has not been moved and so no cross-over violation is predicted. Since these last examples have by-clauses that are unambiguously

'method', we would expect that they cannot be preposed. In fact though, they are not unambiguous; there is also an 'enabling' interpretation. When the by-clauses are preposed the 'enabling' interpretation is the only one possible:

By crossing his fingers John reminded himself to pick up lettuce.

By looking at his pupils John satisfied himself that he was drugged.

By feeling his pulse John persuaded himself (not) to drive home.

By studying the map they persuaded themselves that they were lost.

Recall, however, that the subjects of sentences with 'enabling' by-clauses cannot be agents. So when a manner adverb that requires an agent subject is added to these sentences, they become unacceptable. If the by-clause is not preposed, the 'method' interpretation is still possible and it is okay to add the manner adverb.

John wisely reminded himself to pick up lettuce by crossing his fingers.

*By crossing his fingers John wisely reminded himself to pick up lettuce.

*John crossed his fingers, thereby wisely reminding himself to pick up lettuce.

John carefully satisfied himself that he was drugged by looking at his pupils.

*By looking at his pupils John carefully satisfied himself that he was drugged.

*John looked at his pupils, thereby carefully satisfying himself that he was drugged.

John stupidly persuaded himself to drive home by feeling his pulse.

*By feeling his pulse John stupidly persuaded himself to drive home.

*John felt his pulse, thereby stupidly persuading himself to drive home.

They methodically persuaded themselves that they were lost by studying the map.

*By studying the map they methodically persuaded themselves that they were lost.

*They studied the map, thereby methodically persuading themselves that they were lost.

One difficulty in interpreting the cross-over evidence is that application of the adverb-to-subject rules does not produce violations. John crosses over John in

John's having his fingers crossed reminded him to pick up lettuce.

The sentential subject is a by-clause that has been moved into subject position by adverb-to-subject. In this case however, the moved noun phrase that is coreferential with the object is not mentioned by the rule that does the moving. Ross has discovered that cross-over violations are not produced unless the coreferential noun phrase is mentioned by the movement transformation.¹⁰ This difficulty is thus easily disposed of.

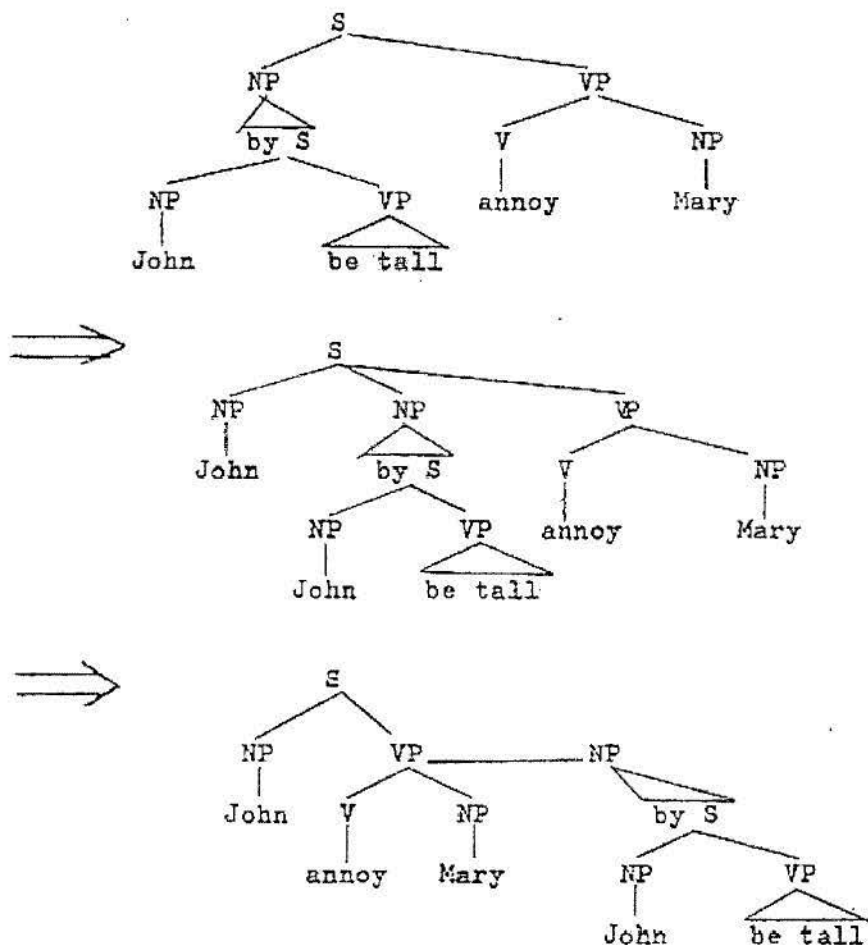
¹⁰J. R. Ross, Constraints on Variables in Syntax, M.I.T. dissertation, unpublished; 1967; section (4.30), p. 132.

The cross-over condition as Ross states it is

"No NP mentioned in the structural index of a transformation may be reordered by that rule in such a way as to cross over a coreferential NP."

The fact that the moved noun phrase must be mentioned in order to produce a violation prevents us from reformulating the abstract subject solution so that it works. The data in previous sections is not inconsistent with the following

formulation: 'Subject' by-clauses are from manner adverbs in subject position. To produce the characteristic paraphrases of 'subject' by-clause sentences, the by is deleted. E.g., by John's being tall annoyed Mary becomes John's being tall annoyed Mary. The by-clause version is given by first sister-adjoining a copy of John to the by-clause, then moving the by-clause to the end of the verb phrase. In pictures:



The subject of the by-clause, John, is then deleted by subject-deletion. In this formulation the subject of the by-clause is moved over the main sentence object. However, the rule that

moves the by-clause to the end of the verb phrase would not mention the by-clause subject, and so the cross-over violations would not be predicted. Notice that we cannot save this formulation by saying that the cross-over principle restricts deletions rather than movements. One might wish to say that no coreferential noun phrase may come between a deleted noun phrase and its antecedent. This would be in conflict with what happens in the 'method' by-clause. The subject of a 'method' by-clause can be deleted by the main sentence subject even when the intervening object is coreferential.

Another difficulty with the cross-over evidence can be resolved in a similar fashion. We must account for why

John satisfied the doctors that he was drugged by
feeling no pain.

is acceptable in spite of the fact that the by-clause subject, John, is moved over the coreferential subject of the that-clause. The explanation lies in an extension of Ross's mention proviso to the cross-over principle. In order to produce a violation, the two coreferential noun phrases must both be mentioned in the structural index of the movement transformation. The extraction transformation must mention the direct object and the that-clause as a whole, but it does not mention the subject of the that-clause or any other noun phrase contained in the that-clause or the direct object. Extraction will be formulated in approximately the following fashion:

X, V NP (NP) by, NP, VY →

1 2 3 4 5

1 4+2 3 ∅ 5

Extending the mention limitation on the cross-over principle to include noun phrases not moved is, I believe, implicit in

Postal's discussion of "constant movement" transformations (Postal, op. cit.). The extension is intended to replace Postal's "clause-mate condition". Variables in structural descriptions which are "crucial" rather than merely "abbreviatory" are to be regarded as implicitly mentioning all the noun phrases included in the strings they represent.

An apparent exception to what has been said about cross-over violations is provided by the following sentence:

John revealed himself to be the culprit by having a limp.

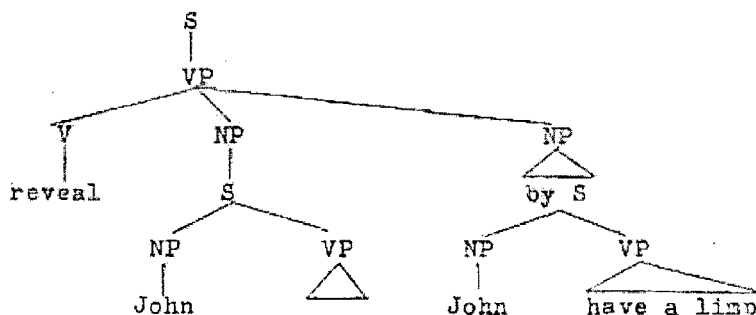
Apparently John has been moved across himself. The noun phrase represented by himself, however, is not the object of reveal in deep structure. It becomes the object of reveal, by the operation of the subject-raising transformation, which moves the subject of a complement sentence up into the verb phrase.¹¹

¹¹See Paul and Carol Kiparsky, "Fact," to appear in Bierwisch and Heidolph (eds.), Recent Advances in Linguistics (Mouton).

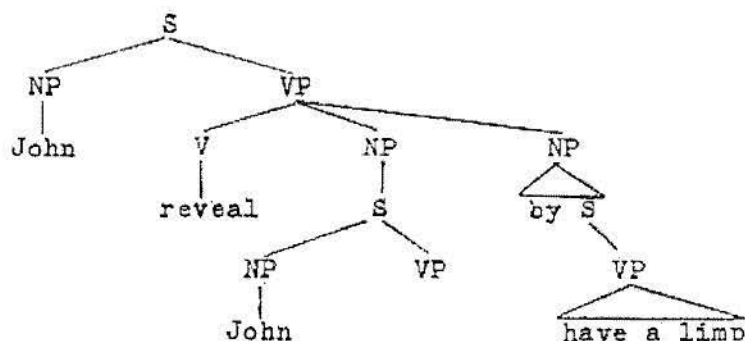
This sentence works like the others, then, if we order extraction before We must also allow the verb phrase of reveal's object complement to be unspecified in deep structure and to be deleted to handle

John revealed himself by having a limp.

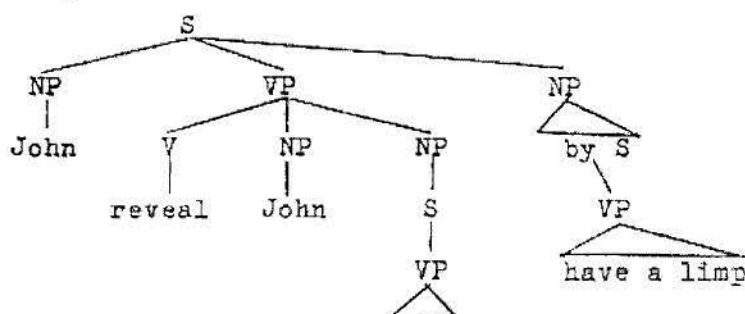
The derivation of this is



extraction:



subject raising:



8. Reformulation of extraction.

There is evidence that extraction is a copying rather than a movement transformation. So far we have considered only 'by-clauses', the term having been defined to include only phrases of the form by plus gerundive nominal. Phrases which consist of by plus action or derived nominals¹² seem

¹²The distinction gerundive/action nominal is from R. B. Lees, The Grammar of English Nominalizations, Mouton, 1966, p. 64-68. I use the distinction only in its formal sense, with no implication that the gerundive nominal cannot refer to actions, or that the action nominal always refers to actions.

to work in much the same way as by-clauses, except for retaining their subjects. For example in

John annoyed Mary by his early departure.

John annoyed Mary by his killing of the gander.

the by-phrases can be either 'method' or 'subject'. In the latter sense, the sentences have the paraphrases

John's early departure annoyed Mary.

John's killing of the gander annoyed Mary.

The subjects of the main sentence and by-phrase must be identical:

*John annoyed Mary by Harry's early departure.

*John annoyed Mary by his ouster.

In the last example, the his is from the underlying object of oust, rather than a subject.

A nominal from a stative verb makes a 'method' interpretation impossible:

John annoyed Mary by his knowledge of Sanskrit.

= John's knowledge of Sanskrit annoyed Mary.

Naturally, if the by-phrase contains no underlying sentence, there is no subject to agree with the main sentence subject, so the by-phrase cannot be by plus a simple genitive.

*John annoyed Mary by his watch.

In addition, by plus relative clause constructions can function like 'subject' by-clauses; apparently, though, not like 'method' by-clauses:

John annoyed Mary by the terrible things he said.

= The terrible things John said annoyed Mary.

John impressed Mary by the watch that he had.

= The watch that John had impressed Mary.

There must still be agreement between the main sentence subject and a subject somewhere in the by-phrase:

*John annoyed Mary by the terrible things that Harry said.

An interesting question which we will not pursue is how far down in the by-phrase the agreeing subject may be.

If extraction is a copying transformation, there is an apparent conflict with the cross-over evidence presented in the last section, since the cross-over restriction applies to movement transformations. However, copying transformations are also restricted by the cross-over principle, as the following example shows:

John had himself in his car.

This sentence is unambiguously causative, whereas sentences of this form are generally ambiguous. For instance

John had a dog in his car.

is either causative, or it is a paraphrase of

A dog was in John's car.

In the latter reading, it is derived by application of the fronting transformation, which copies John out of John's car. But fronting cannot apply in this way to

John was in his (John's) car.

The subject of the sentence cannot be copied because of a general restriction on fronting. The John can't be copied out of John's car because of the cross-over principle.

Since extraction copies, the subjects of by-clauses must be deleted by some additional rule. The deletion can be accomplished by subject-deletion--the rule needed to delete derived subjects of 'method' by-clauses. Just as sentences with 'method' by-clauses must meet the structural description of subject-deletion, so must sentences with 'subject' by-clauses. The situation where the subjects could be different in a 'subject' by-clause sentence arises when the passive transformation applies to the main sentence.

annoy Mary by someone be tall .
 extraction: Someone annoy Mary by someone be tall
 passive: Mary be annoyed by someone by someone be tall
 subject deletion: blocks
 Thus the sentence

Mary was annoyed by being tall.
 has only one interpretation--as containing a passive by-clause.
 It cannot also be interpreted as having a 'subject' by-clause
 with the understood subject someone. An interpretation as a
 'subject' by-clause with the understood subject Mary is blocked
 by the cross-over restriction.

9. Subject-deletion.

The subject-deletion transformation is involved in the
 derivations of both 'subject' and 'thod' by-clauses. The
 subjects of the two types of by-clauses must undergo subject-
 deletion, or, to put it another way, sentences with either type
 of by-clause are positive absolute exceptions to subject-
 deletion. In this section it will be argued that there is
 independent motivation for the subject-deletion transformation
 inasmuch as it falls together with the transformation equi-
 NP-deletion.¹³

¹³This is Rosenbaum's 'identity erasure' transformation
 (op. cit.). The term 'equi-NP-deletion' is used by Lakoff and
 Ross in recent papers.

Equi-NP-deletion deletes the subjects of sentential object
 complements when they are identical with some noun phrase in
 the main sentence. For example, equi-NP-deletion (along with
 complementizer introduction and placement) changes

I expect [I leave].

to .

I expect to leave.

The similarity between subject-deletion and equi-NP-deletion is obvious. They both delete subjects of sentential complements when the subjects are the same as a noun phrase in the main sentence. There is a crucial difference, however. The antecedent of the deleted noun phrase is the main sentence subject for subject-deletion, but for equi-NP-deletion the antecedent can be either the main sentence subject or the object, if there is one. (There are other possibilities for the antecedent--see Rosenbaum, op. cit., p. 17.) We will try to explain away this difference by showing the following:

- a) Equi-NP-deletion must be split up into two transformations. One version, pre-equi-NP-deletion, applies precyclically; the other, equi-NP-deletion, is cyclical.
- b) The antecedent for (cyclical) equi-NP-deletion is the main sentence subject.
- c) Pre-subject-deletion can be formulated so that the antecedent is determined in the same way as the antecedent for pre-equi-NP-deletion. So pre-subject-deletion falls together with pre-equi-NP-deletion.

There are two reasons for believing that equi-NP-deletion has to be split up. First, consider the identity requirement between the object of persuade and the subject of persuade's sentential complement. This requirement is discussed at length by Perlmutter (op. cit.). He gives the example

*I persuaded Clarabelle for Clem to plow the field.
(p. 51)

Perlmutter argues that the identity requirement must be enforced on the main sentence before the passive transformation has a chance to apply to the sentential complement. This implies that the identity requirement must be enforced precyclically. We will accept this conclusion here without reviewing Perlmutter's

arguments. But Perlmutter goes on to conclude that the identity constraint must be enforced at the level of deep structure. There is obviously another possibility, and that is that the identity requirement is enforced by a transformation that applies precyclically. That is, if there is a precyclical version of equi-NP-deletion, the identity requirement can be enforced by making sentences with persuade positive absolute exceptions to pre-equi-NP-deletion. Perlmutter rejects this other possibility "from silence". That is, since there is apparently no such transformation as pre-equi-NP-deletion, we must accept the deep structure constraint solution. However, looking at the matter another way, if there is evidence against the deep structure constraint solution, we would be forced to admit the existence of some precyclical transformation, such as pre-equi-NP-deletion, that "looks" at the noun phrases which are required to be identical. And, in fact, there is evidence that the deep structure constraint solution is wrong. If the sentential complement of persuade is a that-clause instead of an infinitival complement, the complement's subject need not be the same as the object of persuade---

I persuaded Clarabelle that Clem should plow the field.

Thus Perlmutter's solution would force us to regard the differences between a that-clause and an infinitival complement, in this case at least, as deep structure differences, rather than superficial differences. Now it may be that appearance of the infinitive form is conditioned by some fact about the deep structure--for example the absence of tense in the auxiliary of the complement. But what any such putative difference might have to do with the identity requirement seems to be quite mysterious. We conclude that the identity requirement is not to be enforced with a deep structure constraint, but rather

a transformational constraint. Perlmutter's arguments show that the transformation involved must be precyclical.

The second motivation for splitting up equi-NP-deletion is given by a reinterpretation of Lakoff's argument that the rule S-deletion is a "ubiquitous" rule; that is, can apply at any point in the derivation (Lakoff, "Deep and Surface Grammar," unpublished, 1966). The details of Lakoff's argument will not be given, and we will quote only the crucial examples.

Consider first Lakoff's example:

Mary was believed by John to be pregnant, but Harry
didn't believe it. (p. I-60)

The it stands for

Mary be pregnant

It follows from this example that the rule which deletes Mary be pregnant, leaving behind the it, must be precyclical, because this rule, S-deletion, applies to the whole sentence before the cyclical rules it-replacement and passive apply to the first conjunct.

Lakoff shows that S-deletion is preceded by equi-NP-deletion with the following example:

John decided to run for office, but I will not
stoop to it. (p. I-121)

The it stands for

I run for office

Since the antecedent of the deleted sentence is

John run for office

the subjects of the antecedent and the sentence to be deleted must be deleted by equi-NP-deletion before S-deletion applies; otherwise the recoverability condition would be violated.

At this point Lakoff concludes that either there are two S-deletion rules, one precyclical and the other cyclical, or else equi-NP-deletion is precyclical. Another possibility,

the solution we will adopt, is that there are two equi-NP-deletion rules. There are, then, the following conceivable orderings:

	I	II	III
precyclical:	S-deletion	(pre)-equi-NP-deletion S-deletion	equi-NP-delet: S-deletion
cyclical:	equi-NP-deletion S-deletion	equi-NP-deletion	

Lakoff argues against II and III; however we will show that his argument against II is fallacious, and that I does not adequately account for the facts, whereas II does.

First, it is agreed that III is impossible. Lakoff shows that the passive transformation is cyclical (p. I-52), and that equi-NP-deletion follows passivization. The example that shows the latter is:

Mary wants to be beaten by Otto. (p. I-124)

The argument against II is provided by the example:

I expected John to be examined by me, not by
Harry. (p. I-123)

The underlined words have contrastive stress. If equi-NP-deletion were precyclical, then it would have to precede the passive transformation, since the latter is cyclical. But if this were so, the above sentence would be impossible, because equi-NP-deletion is an obligatory transformation. Thus we do not get.

*I expected me to examine John.

The first person subject of examine would be deleted before it could be affected by the passive transformation, so there would be no source for me in by me.

What this demonstration ignores, is the acceptability of

I expected me, not Harry, to examine John.

It appears that what is really going on is that equi-NP-deletion cannot delete a noun phrase containing a contrastively stressed element. Hence alternative II cannot be rejected on Lakoff's grounds. In fact, the unacceptability of

*I expected John to be examined by me.

where me is not contrastively stressed, seems to be evidence for alternative II (but see below).

We now present some phenomena that are accounted for by alternative II, but not by I. Recall that in sentences with 'method' by-clauses, the subjects of the main sentence and the by-clause are agents. The by-clause subject is deleted by pre-subject-deletion, which, therefore only deletes agents. Pre-equi-NP-deletion also deletes only agents, while cyclical equi-NP-deletion deletes other noun phrases as well. A general explanation of this fact will be suggested in the next section. For the present, notice that in Lakoff's example,

John decided to run for office, but I wouldn't
stoop to it.

the subject of run for office, John and I, are both agents. One cannot find acceptable sentences like this in which the verb of the deleted sentence is stative and so could not take an agent subject. Notice also, that

John expected to frighten the baby.
is ambiguous. John could be contemplating a deliberate action, or he could merely be anticipating a probable (unfortunate) state of affairs. However in the next example this ambiguity does not exist in either conjunct.

John expected to frighten the baby, but I wouldn't
stoop to it.

These facts can be accounted for under alternative II by restricting pre-equi-NP-deletion to the deletion of agents. They cannot be accounted for under alternative I, so far as I know; alternative I is therefore rejected.

To return to the previous example,

*I expected John to be examined by me.,
note that since pre-subject deletion does not delete agents, we would expect this to become acceptable if a stative verb is substituted for expect. This turns out not to be the case; evidently there is some additional restriction at work:

*I expect John to be seen by me.

*I expect John to have been examined by me.

Next we must show that the antecedents for equi-NP-deletion and pre-equi-NP-deletion are different. Consider the following example, which was provided by D. T. Langendoen:

John asked the guard to be admitted to the meeting
room.

The deleted subject of the infinitival complement is understood to be John. The deletion of John must be performed by equi-NP-deletion, since John is not the subject of the complement when pre-equi-NP-deletion applies. Compare:

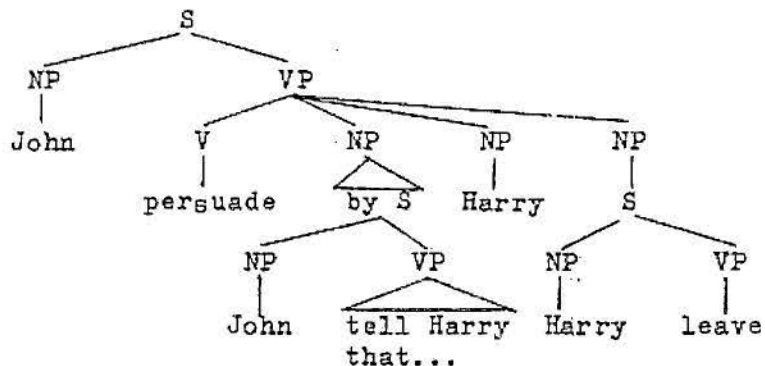
John asked the guard to admit him to the meeting
room.

Here the understood subject is the guard; the antecedent, instead of being the subject, is the object of the main sentence. In this case the guard is deleted by pre-equi-NP-deletion. So we have shown that cyclical equi-NP-deletion is like subject-deletion in taking the main sentence subject as its antecedent. We therefore combine equi-NP-deletion and subject-deletion into one rule, which we call equi-NP-deletion.

We now show that pre-subject-deletion and pre-equi-NP-deletion can be made to fall together. Consider:

John persuaded Bill to leave by telling him the
barn was on fire.

Pre-equi-NP-deletion and pre-subject-deletion both apply in the derivation of this sentence, the antecedents being, respectively, the main sentence object and subject. If the two rules are to be combined, the determination of the proper antecedent must be made in some uniform way. This can be done, if the sentence is assigned the following deep structure:



With reference to this tree, the antecedent is the first noun phrase in the main sentence that precedes the noun phrase to be deleted. The justification for putting the by-clause immediately after the verb is as follows. Some types of sentences have related inchoatives (I use the term loosely). For example, corresponding to

John froze the water.

we have

The water froze.

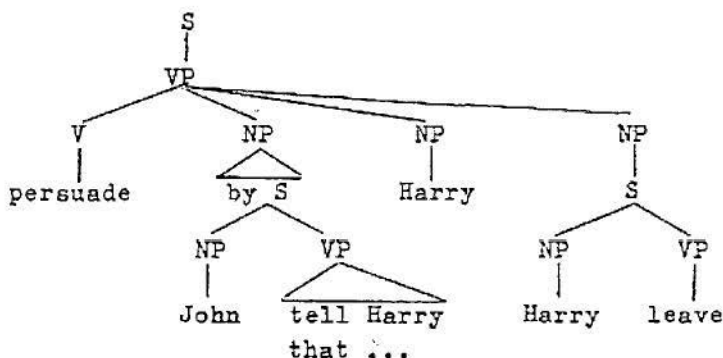
The noun phrase immediately following the verb in the sentence with an agent, becomes the subject of the inchoative, if this agent is missing. If, in a sentence with an agent, the complements can be switched around, there are two possible inchoatives, and the noun phrase next to the verb is the one that becomes subject.

John hung cobwebs in the kitchen.

Cobwebs hung in the kitchen.

?The kitchen hung with cobwebs.

This kind of alternation, though, seems marginal in present English. See Lee (op. cit., p. 73) for a fuller discussion. Since apparently there is a rule which, in the absence of an agent, makes the first noun phrase into a subject, we can dispense with the adverb-to-subject rule that was posited earlier. That is, if the by-clause is first and there is no deep structure subject, we will have a deep structure,



By the inchoative rule just discussed, the by-clause will become the derived subject:

John's telling Harry that the barn was on fire
persuaded Harry to leave

Although the adverb-to-subject rule is eliminated, another rule is required to postpose the by-clause. This rule of postposition must precede extraction in order to retain our account of the cross-over violations. We see, then, that nothing is lost by putting the by-clause immediately after the verb in deep structure. Another rule is required, but one rule is also saved.

Since the problem of different antecedents can be resolved in this fashion, we will combine the rules pre-equi-NP-deletion and pre-subject-deletion. The new rule will be called pre-equi-NP-deletion.

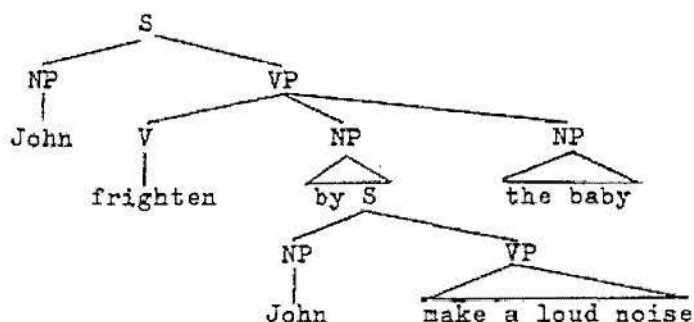
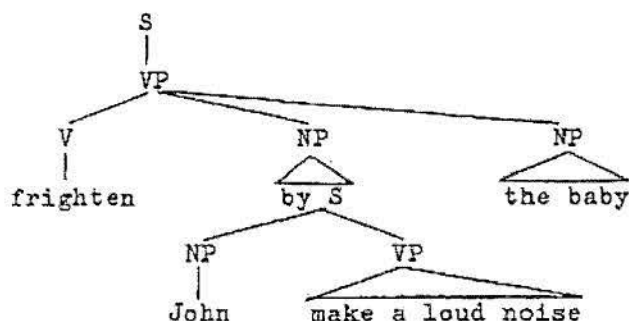
To summarize, we list the rules that have been mentioned, in the order required by the discussion in this and the preceding sections.

Precyclical:	pre-equi-NP-deletion S-deletion
Cyclical:	inchoative postposition of <u>by</u> -clause extraction subject-raising passive equi-NP-deletion

10. Ambiguous by-clauses.

We have concluded that the like-subject requirement is correctly accounted for in the case of sentences with 'method' by-clauses by the two noun phrases solution and in the case of sentences with 'subject' by-clauses by the no subject solution. Let us now consider the ambiguous cases--where by-clauses can be interpreted either as 'subject' or as 'method' by-clauses. The situation arises only when the understood subject of the by-clause is, or may be, an agent.
E.g.:

John frightened the baby by making a loud noise.
The deep structures of this sentence, corresponding to the 'subject' and 'method' interpretations respectively, are:



The claim is that the only difference between the deep structures is the absence of a deep structure subject in one, its presence in the other. We have already argued that the verbs in corresponding purposive and non-purposive sentences are to be identified (section 2). It has also been argued that 'subject' and 'method' by-clauses are both manner adverbs--they can be questioned with how, for example. Since, in addition, there is no reason to regard the main sentence objects as having different statuses in the 'subject' and 'method' senses, the hypothesis is at least tenable that the purposive ambiguity results from the optionality of the deep structure subject. In what follows, this hypothesis will be tested in the following way. We will note the circumstances under which sentences like the frighten sentence can be

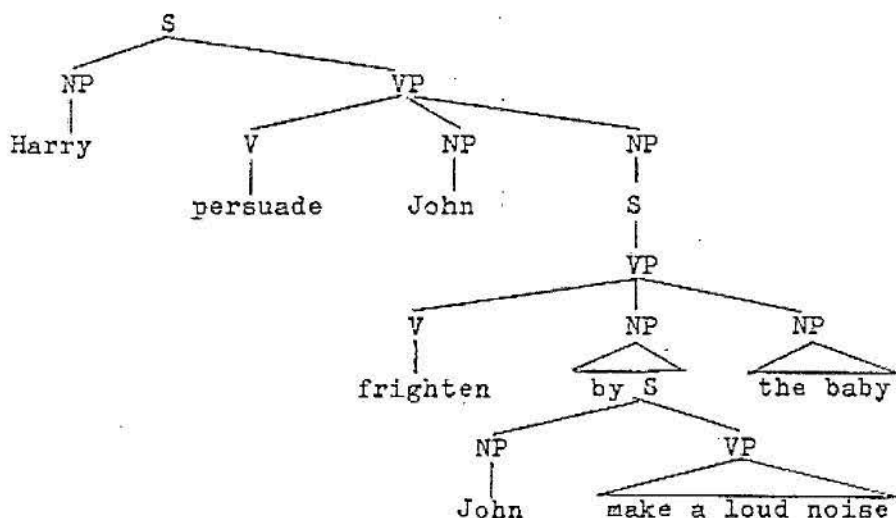
disambiguated. If the optional subject hypothesis is correct, the disambiguating contexts should be syntactically interpretable as requiring or disallowing a deep structure subject.

To begin, let us consider the tests for agents discussed in section 2. One of these is whether a sentence can occur as the infinitival complement of persuade. For example, the ambiguity of

John frightened the baby by making a loud noise.
disappears in

Harry persuaded John to frighten the baby by making
a loud noise. (where John is the subject of
make).

We found in section 9 that the subject of frighten is deleted by pre-equi-NP-deletion and that such a deletion must actually take place in sentences with persuade plus infinitive. Suppose that we started with the deep structure:



This could not give rise to a surface sentence with an infinitival complement, because there is no subject for pre-equi-NP-deletion to delete. The subject that is supplied by

the extraction transformation gets there too late to be deleted by pre-equi-NP-deletion; pre-equi-NP-deletion, being precyclical, must apply before extraction, which is cyclical. Hence we have correctly predicted that the nonpurposive sense of the frighten sentence is impossible in the infinitival complement of persuade. If the complement is realized as a that-clause, the derivation does not block. In this case pre-equi-NP-deletion need not apply, and so

Harry persuaded John that he frightened the baby.
has the non-purposive sense. (And, as it happens, only this sense.)

The other agent tests will not be discussed. It is assumed that they also involve absolute exceptions to pre-equi-NP-deletion. We conclude that the agent tests are actually tests for deep structure subjects. This does not explain why sentences with stative verbs fail the agent tests; but it will henceforth be assumed, without evidence, that such sentences do not have deep structure subjects. With this assumption, we account for another way in which the purposive ambiguity is destroyed. When a stative verb is substituted in the by-clause only the non-purposive interpretation is possible:

John frightened the baby by being tall.

As previously remarked, sentences with 'method' by-clauses must undergo the pre-subject-deletion, which we now call pre-equi-NP-deletion. This claim is now changed to read, sentences with by-clauses and deep structure subjects are positive absolute exceptions to pre-equi-NP-deletion.¹⁴

¹⁴This absolute exception requirement is awkward to state; we would expect such a requirement to be governed by some lexical item rather than a complex set of circumstances. It is worthwhile to mention again a possibility brought up in section 5; that the requirement that 'method' by-clauses

undergo pre-equi-NP-deletion is stated as a surface condition on by-clauses. Namely, by-clauses must have their subjects removed. But in light of the discussion in section 8 of the by-phrases that retain their subjects, but nevertheless behave in other ways just like by-clauses, another possibility suggests itself. Perhaps there are certain formal characteristics of by-clauses whose appearance is conditioned by the removal of their subjects. A formal difference between by-clauses and the similarly-acting by-phrases is that the latter have of before their objects. (Cf. Lees, op. cit. This is one difference between gerundive and action nominals.) Then we might say that of can be deleted only if the subject is first removed. This would be parallel to the Kiparsky's observation (op. cit.) that the to of the infinitive appears only when the subject is removed.

But in the above case pre-equi-NP-deletion cannot apply to delete the subject of the by-clause; we have assumed that there is no subject when pre-equi-NP-deletion applies. It follows that there can be no deep structure subject of frighten and no purposive interpretation.

Another way in which ambiguity can be destroyed is by replacing the main sentence verb with a verb that requires an agent, such as assassinate. Assuming that such verbs require deep structure subjects, we account at once for this lack of ambiguity and the fact that sentences with such verbs always pass the agent tests.

Finally, making the main sentence object coreferential with the subject disambiguates the sentence in favor of the purposive interpretation. This follows from the optional subject hypothesis, because if the subject is already there it needn't cross over the object; no cross-over violations are predicted. It is not clear that there is any disambiguation with frighten:

John frightened himself by making a loud noise.
But at least things work out with the examples in section 7.

There are methods of disambiguation for which we have no account. Preposing the by-clause, or substituting for

the subject a noun phrase that refers to something that doesn't move on its own, removes the purposive interpretation.

By making a loud noise John frightened the baby.

The sky frightened the baby.

Let us now consider the ambiguity of sentences with verbs like frighten, verbs that can take either a 'subject' or a 'method' by-clause, but which have no by-clause. For example,

John frightened the baby.

The purposive interpretation of this is no problem. We can say that John is the deep structure subject. But if there is no deep structure subject in the non-purposive sense, where does the surface subject John come from? That John does have to be moved or copied across the object in the non-purposive interpretation is shown by the lack of ambiguity when subject and object are coreferential:

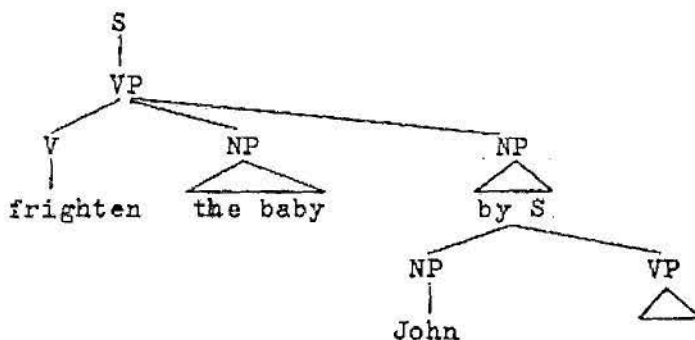
John satisfied himself that he was drugged.

John persuaded himself not to drive home.

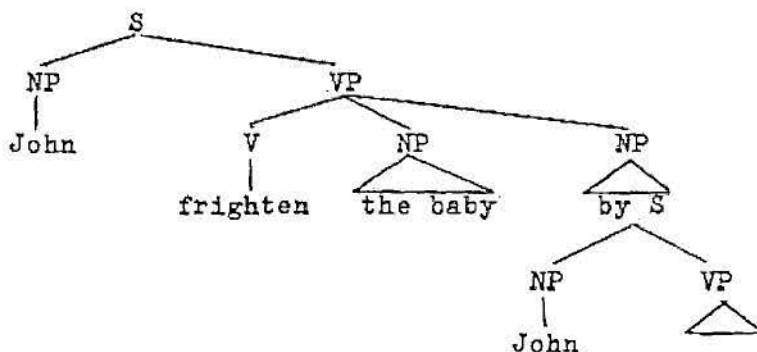
In these sentences a non-purposive interpretation is impossible, as is predicted by the cross-over principle if the surface subject has to be moved or copied into subject position. The copying can be effected by the extraction transformation if we are allowed to postulate an "invisible" by-clause. Suppose that the by-clause's verb phrase is an unspecified dummy, Δ , and that by Δ - is eventually deleted. The derivation of the non-purposive sense of

John frightened the baby.

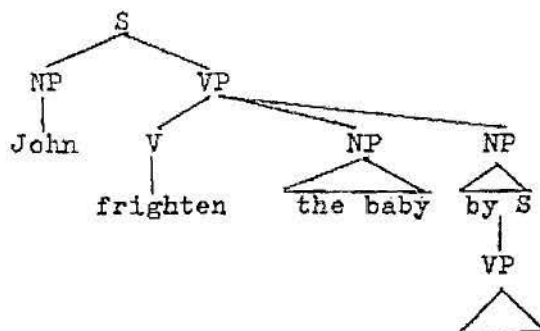
will then be as follows:



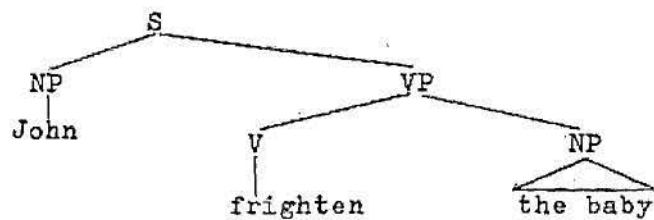
extraction:



Subject-deletion:



deletion of by Δ :



As for justifying this account, we first observe that it probably doesn't cost anything. We found earlier that an unspecified verb phrase must be postulated to account for the acceptability of

John revealed himself by having a limp.
Presumably also, by Δ is deleted after the passive transformation has applied to a sentence with an unspecified subject. On the positive side, notice that we are maintaining that if a sentence with a frighten-type verb has no agent and no by-clause, it is incomplete, and this seems intuitively correct. Consider that the following two sentences form a connected discourse.

A. The poison caused Mary's death;

B. The poison was in the pill she took.

Cause may take either a 'subject' or a 'method' by-clause. The surface subject of cause, the poison, is not an agent, so it must be from a by-clause with unspecified verb phrase. The second sentence, B, is taken as filling in what is left unspecified in the first sentence. Now having asserted A and B, it would be very odd to add in the same breath:

C. The pill Mary took did not cause her death.

This is because, instead of saying A and B, with equal force the following could have been asserted:

The poison caused Mary's death by being in the
pill she took.

Which, in turn, means the same or nearly the same as

The pill Mary took caused her death by containing
the poison.

(We predict this synonymy from the synonymy of The poison was in the pill, and The pill contained the poison.)

Since this is a contradiction of

C. The pill Mary took did not cause her death.

we have explained the oddity of the C in the context given by

the sentences A and B. It is difficult to see how this oddity could be explained if inanimate subjects of cause were taken to be deep structure subjects.

Another argument for regarding an inanimate (or purposeless) subject of cause, frighten, etc., as coming from a zeroed by-clause proceeds from the difference in acceptability between

- A. John deliberately frightened the baby in a rapid manner.

and

B. *The sky frightened the baby in a rapid manner.
In a rapid manner is a manner adverb that does not, ordinarily, require an agent. Compare:

The sky darkened in a rapid manner.

But with frighten type verbs, evidently in a rapid manner does require an agent. We can account for this by postulating that there can be only one manner adverb per (deep structure) clause. A by-clause is a manner adverb, so the zeroed by-clause in

The sky frightened the baby.

occupies the manner adverb slot for this clause. Another manner adverb cannot be added. Hence the unacceptability of B above, confirms the existence of the zeroed by-clause. In the A sentence there is no reason to postulate a zeroed by-clause, since John is the deep structure subject. The manner adverb in A fills the position that could also have been filled with a 'method' by-clause. Note that deliberately in the A sentence is not a manner adverb. One cannot answer the question

How did John frighten the baby in a rapid manner?
by saying

*Deliberately.

(For why one can ask the question, see below.)

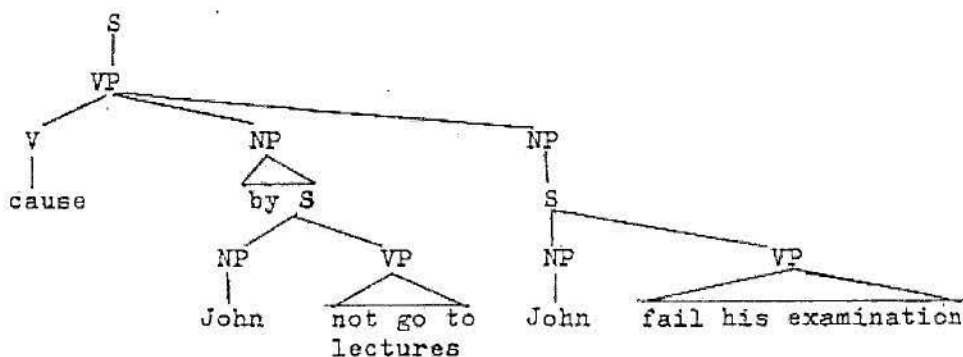
In addition to the ambiguity between 'subject' and 'method' by-clauses, there are also ambiguities between 'cause' and

'method' by-clauses. For instance:

John failed his examination by not going to lectures.
This ambiguity disappears, when the sentence is submitted to
an agent test. There is no 'cause' sense in

Harry persuaded John to fail his examination by
not going to lectures. (where John is subject
of go)

So we must find some subjectless deep structure for the 'cause'
sense. We propose, tentatively, the following:



To get the right surface structure, cause must be deleted,
and the by-clause somehow lowered into the verb phrase fail
his examination. The motivations for this deep structure are:
first, by the inchoative rule it gives the paraphrase of the
'cause' sense

Not going to lectures caused John to fail his
examination.

And secondly, we preserve the generalization that manner
adverbs occur only in a sentence whose main verb is non-stative.
Without the superordinate cause sentence, such sentences as
John heard the angels by falling into the pickling
vat.

would violate this generalization. Also it seems that the verbs

that can occur in the object complement of cause are the same verbs that take 'cause' by-clauses, namely verbs that can express events. Know is not such a verb, and the following two sentences seem equally odd.

?John knew Sanskrit by studying a lot.

?Studying a lot caused/enabled John to know Sanskrit.

Finally, supposing 'cause' by-clauses to come from higher sentences with cause accounts for some exceptions to the above generalization that there can be only one manner adverb per clause. Recall that 'enabling' by-clauses are derived from 'cause' by-clauses by deletion of succeed in. 'Enabling' by-clauses are then also from high sentences. Now consider

John assassinated the Premier quickly by using a gun.

John frightened the baby quickly by being tall. The by-clauses here cannot be interpreted as 'method' and 'subject', respectively. (They could be so interpreted if it weren't for the quickly's.) Rather, in the first sentence, the by-clause is 'enabling':

Using a gun enabled John to assassinate the Premier quickly.

In the second sentence the by-clause is either 'cause' or 'enabling':

Being tall caused/enabled John to frighten the baby quickly.

The fact that the by-clauses are not 'method' or 'subject' confirms the one-manner-adverb-per-sentence generalization. These cases where quickly cooccurs with a 'cause' or an 'enabling' by-clause are not exceptions to the generalization, because quickly and the by-clause arise in different deep structure clauses. In the question

How did John frighten the baby in a rapid manner?

the how questions a 'cause' or 'enabling' by-clause.

We should mention that the quickly in

?John's being tall frightened the baby quickly.
is not a manner adverb. This can be seen both from the fact
that it cannot be replaced by in a rapid manner:

*John's being tall frightened the baby in a rapid
manner.

and from the fact that the question

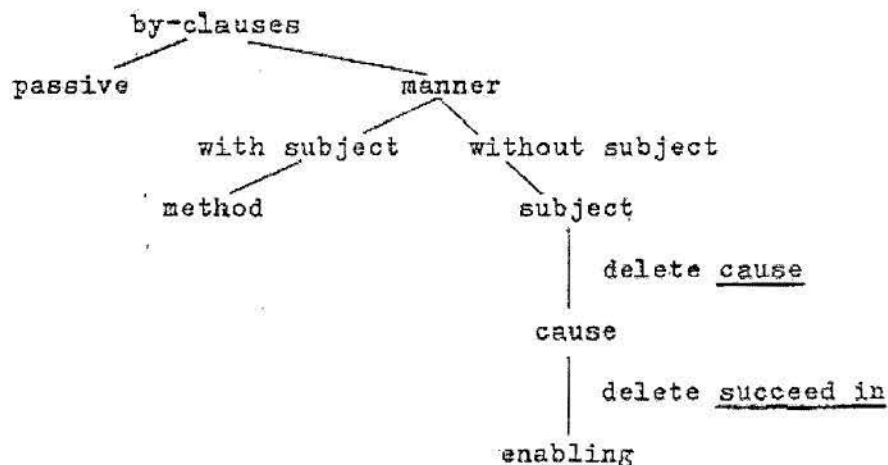
How did John's being tall frighten the baby?
cannot be answered:

*Quickly.

Rather what we have here is a postposed sentence adverb, from:

John's being tall quickly frightened the baby.

The higher sentence analysis for 'cause' and 'enabling' by-
clauses enables us to revise the chart given in section 3.
Our new taxonomy of by-clauses is:



In conclusion, we hope to have shown that sentences
express purpose if and only if they have deep structure
subjects. Sentences that express purpose have agents, and

agents are deep structure subjects. When a sentence does not have an agent, the noun phrase that appears as surface subject may have various semantic relationships to the main verb and other elements of the main sentence. This is just what one would expect if such noun phrases are transformationally introduced into subject position, because transformations are notorious for obscuring underlying semantic relationships.

It is clear, however, that the presence of a deep structure subject is not sufficient to characterize the differences--in particular, the semantic differences--between purposive and non-purposive sentences. But assuming that the remaining problems can be defined and solved, we make the programmatic suggestion that other case relationships such as 'patient' and 'goal' need not be taken as primitives. That is, we hope that the primitive categories of syntax can be held to a very small number, including things like 'sentence', 'noun phrase', 'verb', but not things like 'agent', 'patient', etc.